AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

CIVILIAN AND DEFENSE

In This Issue . . .

Latin America Automotive Market · · · Different Cars by Millions · · · · Dutch Military Vehicles · · · · Development of Plastic Aircraft · · · · Shell Mold Casting Method · · · Studebaker Saga

JUNE 1, 1952

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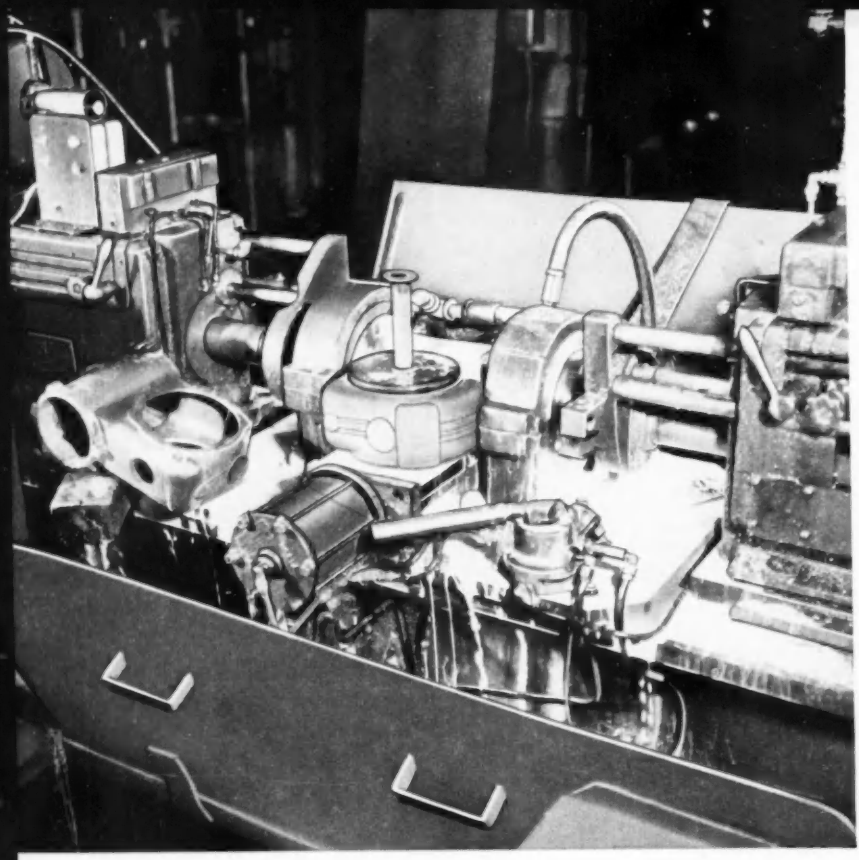
A CHILTON PUBLICATION



Solution for a hard water problem

• "With the hard water we have at this plant, SUPERLA Soluble Oil works best of all products tried," reports Carl J. Winkler, president of U. S. Machine Corporation, Lebanon, Indiana. The company, manufacturing Winkler heating equipment, has used SUPERLA for 15 years. During this period, other coolants have been tried, but none has given the results obtained with SUPERLA Soluble Oil.

Boring of the cast iron main housing for a Winkler oil burner is illustrated above. With SUPERLA Soluble Oil, the life of carbide tools has proved excellent. There has been no spoilage of the work due to rusting. Moreover, clean operation and freedom from odor development with SUPERLA have provided desirable working conditions for machine operators.

SUPERLA
REG. U. S. PAT. OFF.
Soluble Oil

To help select the right coolant or cutting oil for your own machine tool operations, call for the services of a Standard Oil lubrication specialist. Contact your nearby Standard Oil Company office.

What's your problem?

Meet Wesley L. Tharp, lubrication specialist with headquarters at Standard Oil's Indianapolis office. U. S. Machine Corporation is one of the manufacturing companies he contacts regularly in order to help keep production running smoothly.

Like all Standard Oil lubrication specialists, Wesley Tharp has a good background of practical experience plus thorough training in Standard's own schools. And like all specialists, his on-the-job assistance is always available to the industries in the immediate area he serves. He is one of a corps of experienced men who make their headquarters wherever industry is located throughout the Midwest.

Put a Standard Oil lubrication specialist to work on your problem today! When he calls, ask him about such outstanding products as:

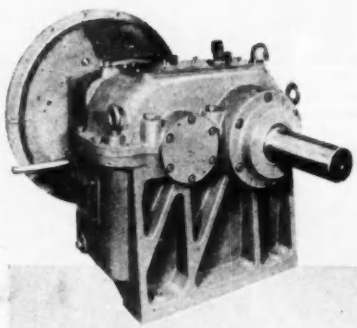
STANICUT Cutting Oils. These special-duty cutting oils meet today's most exacting requirements and highest production schedules. Grades vary in viscosity and compounding. Each contains the correct proportion of extreme-pressure and friction-reducing ingredients.

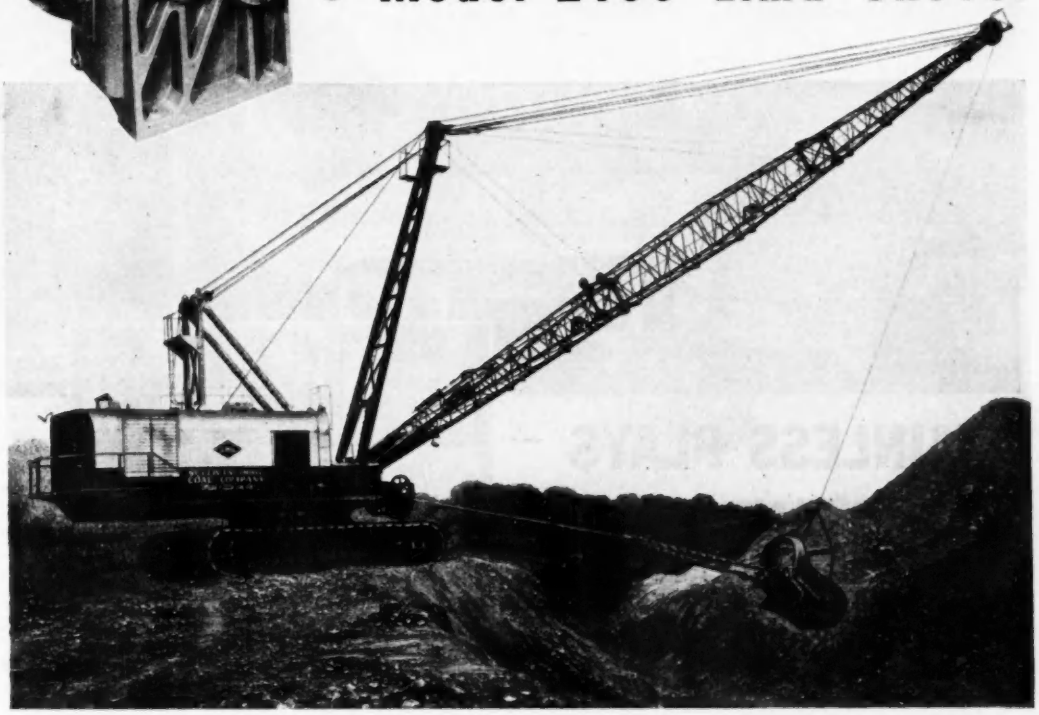
STANOSTAMP Compounds. Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical applications. STANOSTAMPS offer maximum protection for dies and work. These compounds can be readily removed in conventional washing equipment.

STANDARD OIL COMPANY

STANDARD *(Indiana)*

...Cotta Reduction Gear, original equipment on Model 2400 Lima Shovel





Modern, high-speed engines have presented problems to many users and manufacturers of heavy-duty equipment. Cotta has the answer! For cranes, drillers, locomotives, shovels, generators, pumps, etc., Cotta Reduction Units are designed to modify output speed of new engines to meet requirements of such equipment. In these days, particularly, when new equipment will be hard to get . . . when old equipment must be rebuilt . . . when new designs are delayed due to demands of the defense effort . . . "Come to Cotta" for speed reduction and power transmission units. Reduction Gears are available in a broad range of ratios, with input torque from 150 to 2,000 foot pounds.

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem — COTTA engineers will help you select the right unit for best performance. May we work with you?

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

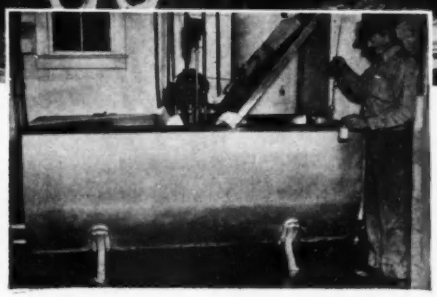
COTTA

HEAVY-DUTY REDUCTION UNITS

"Engineered-to-order"

THIS TRUCK'S 3500 GALLON TANK (insulated) carries bulk milk from farm to city dairy. To maintain purity of contents... and for permanence... it is made from chromium-nickel stainless steel.

AT THE FARM... new milk moves via stainless steel milk lines or buckets into a stainless steel self-refrigerating tank, as shown below, where an agitator mixes it with milk cooled during the previous night. Contents of milkhouse tank are pumped directly into tank truck, and sped to dairy.



STAINLESS PLAYS IMPORTANT ROLE IN NEW SYSTEM

Of Direct Farm-To-Processor Bulk Handling of Milk!

"Something *new* has been added" to the six billion dollar milk industry...

A *new system*... in which chromium-nickel stainless steel contributes to quicker handling, less drudgery, better cooling, and above all, to higher and more uniform quality of product. Simplicity of the system is shown by the illustrations.

Appreciating its many advantages, United States Steel Company, a leading producer of stainless steels, has supplied these corrosion-resisting metals to many fabricators of milk tank trucks, farm bulk milk tanks and allied equipment.

Austenitic chromium-nickel stainless steels are highly resistant to food acids and atmosphere, as well as to most organic and a great many inorganic chemicals. The mechanical properties of stainless steels permit cutting bulk and deadweight without sacrificing strength or durability. Another all-important advantage is that they are easy to clean, and to keep clean.

Leading steel companies produce austenitic chromium-nickel stainless steels in all commercial forms. A list of sources of supply will be furnished on request.

At the present time, the bulk of the nickel produced is being diverted to defense. Through application to the appropriate authorities, austenitic stainless steels are obtainable for many end uses in defense and defense supporting industries. Counsel and data on alloys containing nickel, for your present production or future projects, are yours for the asking. We invite your inquiries.

INCO

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

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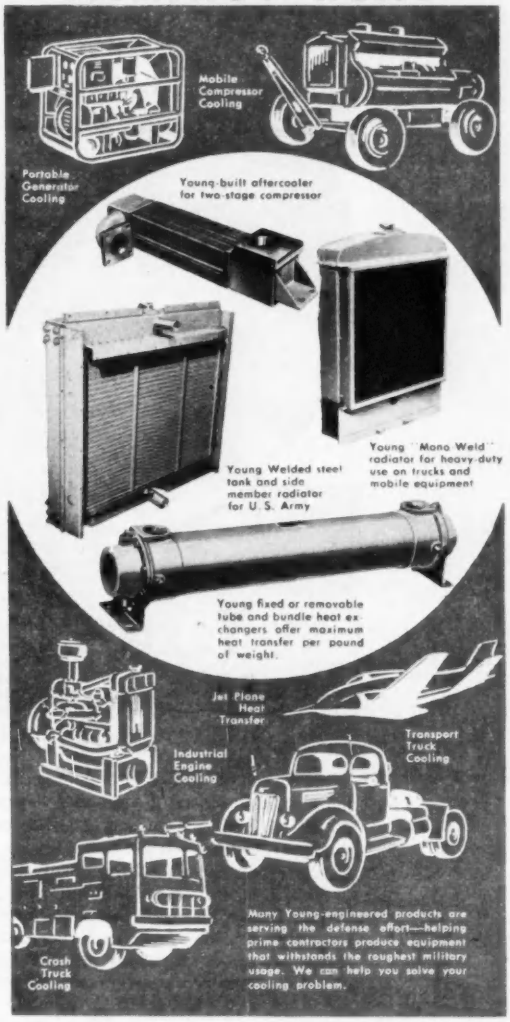
YOUNG WORKS FOR DEFENSE AGAINST HEAT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Young-built aftercooler for two-stage compressor
Young "Mono Weld" radiator for heavy-duty use on trucks and mobile equipment
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Heat Transfer Products for Automotive and Industrial Applications.

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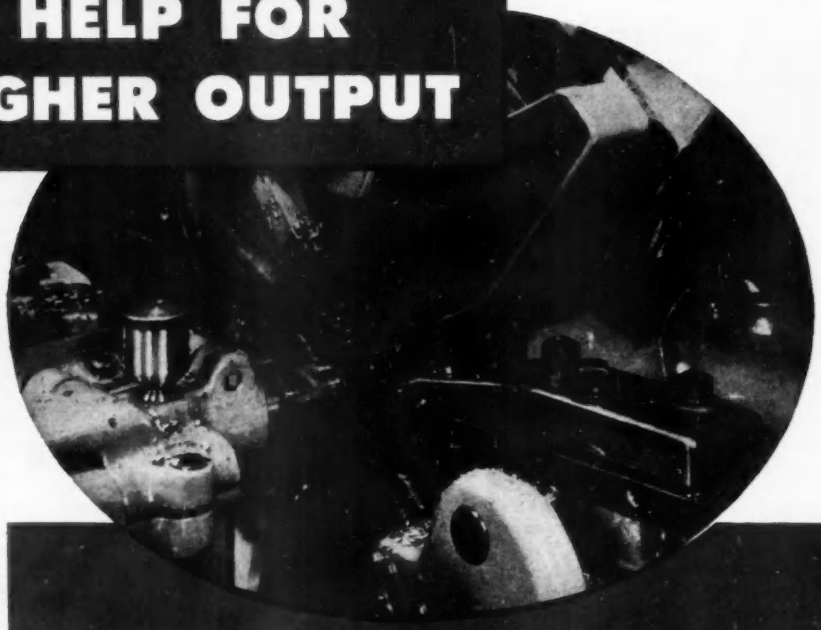
HERE'S TWOFOLD HELP FOR HIGHER OUTPUT



Texaco Cutting Fluids and Lubrication Engineering Service

Whether you're turning, boring, hobbing, grinding or working metal in any other way, you can do the job better, faster and at lower cost with the two-fold help you get from Texaco. That's been proved in plants all over the country.

First of all, you can get *Texaco Cutting, Grinding and Soluble Oils* for every type of machining. Properly used, they assure faster operation, fewer rejects, longer tool life. This means less machine downtime, greater output, lower cost per piece produced.

Secondly, you can call on the assistance of a Texaco Lubrication Engineer specializing in metal working. He knows the peculiarities of the different metals, is thoroughly familiar with tools and machine setups and, of course, is an expert on cutting coolants. He will gladly help your production men select the proper *Texaco Cutting, Grinding or Soluble Oil* and work with them to see that it is used to best advantage.

For hydraulically controlled or operated machines, your Texaco Lubrication Engineer will recommend *Texaco Regal Oil (R&O)* as hydraulic medium. This turbine-grade oil keeps systems free of rust, sludge and foam . . . assures smooth, uninterrupted operation.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

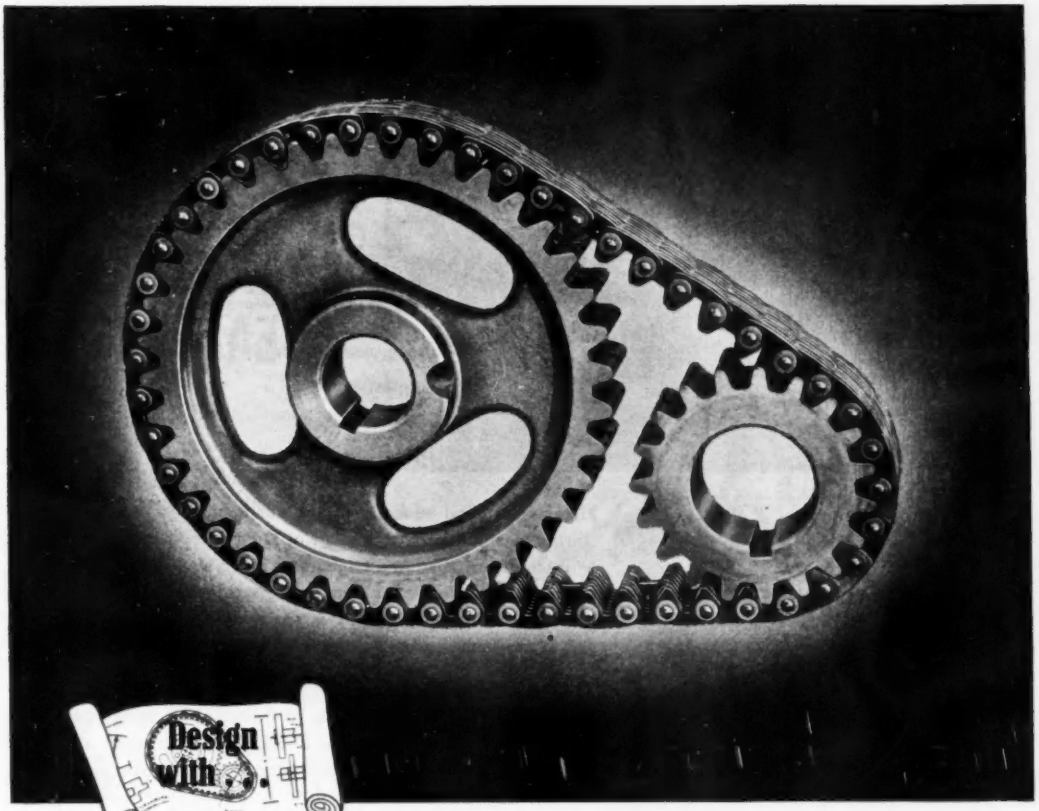
TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

Faithfully yours 50 *for Fifty Years*

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

Be sure you get all 3...

✓ Automatic joint snugness ✓ Smoother operation ✓ Longer life



Link-Belt Timing Chain

Segmental Bushings provide automatic joint snugness

Segmental bushings are made with slight bow.

After initial assembly in chain, bushings are straight.

Bow in bushing acts to keep a snug joint, maintaining chain pitch automatically.

THE secret behind Link-Belt Timing Chain's smoother operation and longer life is the exclusive Segmental Bushing. Note in the sketches above the automatic compensation for wear—provision for complete joint snugness at all times.

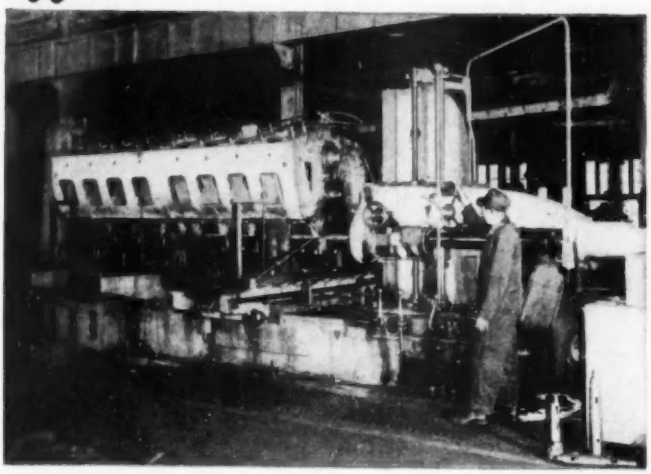
Equally important, the facilities of the world's largest chain plant are your assurance of a continuing supply. Constant research keeps you informed on latest technical advances. Engineering and specification details are in Book 2065.

LINK-BELT

TIMING CHAINS and SPROCKETS

LINK-BELT COMPANY: 220 South Belmont, Indianapolis 6, Ind. Offices in principal cities. 12,742

a Boring plus Performer*



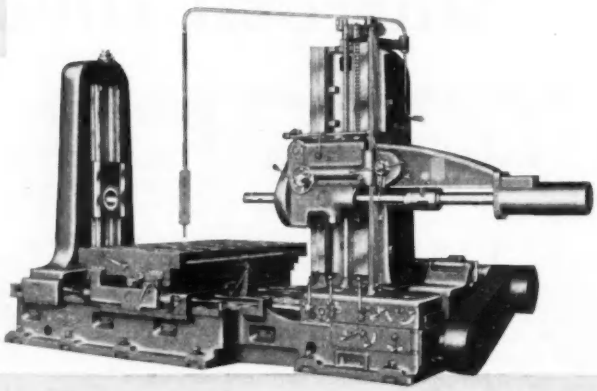
FOR Diesel CRANKSHAFT BEARINGS

Here is a typical example of the adaptability of the Horizontal Boring Machine for a wide range of Diesel shop requirements. This 5″ machine, installed in a large mid-western shop in 1946, is shown boring a Diesel frame for crankshaft bearings using a 6″ dia. x 16′ bar and employing five tools at the same time. It has been used exclusively for this work for the past two years.

The new redesigned Bullard Horizontal Boring Machine is equipped to provide still higher standards of maintained accuracy and more versatile performance. The new heavier design, features a massive 4-WAY bed, motor-driven lubricating pump for the gear boxes, improved hydrodynamic main drive and other important improvements. Write for complete details or better still, have a Bullard man tell you what a Bullard Horizontal Boring, Milling and Drilling Machine can do for you in your own shop.

*And Now
BETTER PERFORMANCE
with*

1. Broad Rigid 4-WAY bed
2. Heavier box type saddle and table.
3. Motor-driven lubricating pump for the gear boxes.
4. Improved hydrodynamic main drive.



**THE
BULLARD
COMPANY
Bridgeport 2, Conn.**

How to remedy common errors in gasket design

The fault

Bolt holes too close to edge.

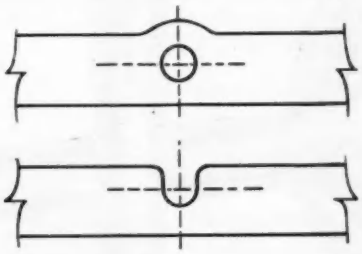
The reason

Gaskets so designed are expensive to make as well as expensive to use. They break easily during stripping and center picking and are easily damaged in transit. Often such gaskets also demand careful handling during assembly.

The remedy

a. An "ear"—strengthens gasket.

b. A notch—removes fragile wall.



You'll find other helpful information on the design and use of gaskets in "Armstrong's Gasket Materials." This 24-page manual discusses subjects such as designing gaskets to reduce cost . . . designing flanges for efficient sealing . . . the effect of surface condition on gaskets, and many others.

You'll find, too, up-to-date information on Armstrong's various sealing and friction materials. Included are government and SAE-ASTM specifications. See this manual in Sweet's file for product designers. For a personal copy, write Armstrong Cork Co., Gaskets and Packings Dept., 1506 Arch St., Lancaster, Pa.

ARMSTRONG'S *Gasket Materials*

Eatonite-Faced Valves

An Important Advancement in Lengthened Valve Life

Eatonite—a heat resistant, corrosion resistant, and wear resistant alloy applied to valve faces by special Eaton-developed techniques—adds materially to valve life in commercial vehicles and heavy-duty industrial engines. An important factor in the outstanding performance records being set by Eatonite-faced valves is the homogeneous structure produced by the Eaton process of applying the hard-facing material. Eatonite-faced valves come well within practical limits from the standpoint of cost; pay for themselves many times over in lengthened life span and freedom from valve trouble. Best results are obtained when Eatonite-faced valves are used in conjunction with Eaton valve seat inserts.

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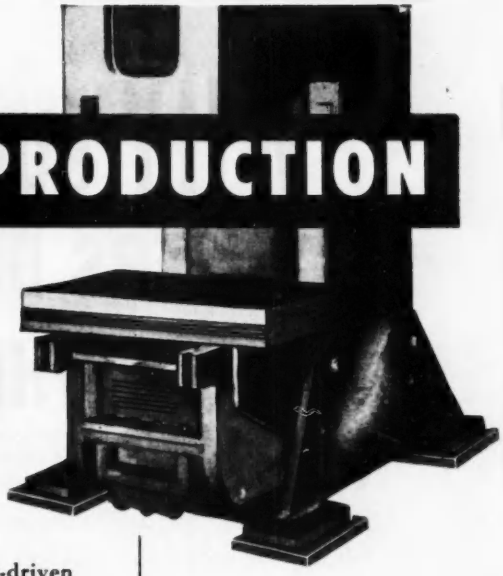
CLEVELAND, OHIO

VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Increase PRODUCTION



REDUCE MAINTENANCE with *Westsorb*

VIBRATION-ABSORBING MACHINE MOUNTS

Elimination of vibration in power-driven machines invariably increases their production.

Westsorb Felt Machine Mountings are easily installed, engineered to every job, low in price and are serving on hundreds of different manufacturing jobs.

Westsorb mountings will not break down under extended impact loads. They resist oil, grease, acid, age—do not ravel or fray. Three degrees of hardness and thicknesses meet every requirement. Adhesive coating both sides makes bolts and floor holes unnecessary.

Westsorb is the ideal mounting for stepping up the wheels of industry.

Western Felt engineers in principal cities are anxious to cooperate in solving your vibration problems.

Westsorb Vibration-absorbing Machine Mounts

- Increase Production
- Lower Machine "down-time"
- Simplifies Installation
- Reduce Plant Noise
- Engineered for Each Job

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- * Diesel Engines
- * Air Compressors
- * Forging Hammers
- * Punch Presses
- * Knitting Machines

Sheet and Roll Felt Manufactured for Special Purposes and To Meet All S.A.E. and Military Specifications.

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FOR 16 PAGE BOOKLET

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WHY SOME DESIGN ENGINEERS DESERVE MORE MONEY THAN OTHERS

● The highest paid design engineer you know has a simple formula. He not only continually strives to "design out the labor," but—like a competent diagnostician—he makes a thorough check before prescribing the "medicine" for even the smallest parts, like fasteners. He knows from experience that their selection is well worth his careful consideration, because the *right* choice brings appreciable savings in production time and costs.

Standard X Washers *do* save time and money. That's why the nation's most successful design engineers are specifying them more and more frequently. Judge how they fit into your designs. They provide a profitable solution to many a problem!

A pair of ordinary pliers quickly and easily presses Standard X Washers to a positive 360° closure—and removes them just as quickly for servicing. Standard X Washers strengthen your product—eliminate consumer kickbacks. Grooved pins are made available for all sizes of Standard X Washers . . . parallel or headed type pins made to your specifications. Send your print for a prompt quotation.

Write for STANDARD'S Detailed Bulletin Today

STANDARD **Locknut and Lockwasher, Inc.**
510 NORTH CAPITOL AVE. • INDIANAPOLIS 4, INDIANA

Light-Weight Arms of Mayari R

LIFT THESE HOIST-TRUCK BODIES

The main hoist arms that raise and lower these heavy-duty hoist-truck bodies are an interesting example of design with low-alloy, high-strength Mayari R steel.

Used for loading and unloading cargo-carrying aircraft, these trucks eliminate any need for ramps or special hoisting equipment. The bodies, either empty or loaded, can be raised to the level of the plane floor and lowered to the level of the truck bed in a few seconds.

The main hoist arms that support the body are subjected to considerable bending moments as well as column stresses when heavy cargo is being handled. The designers used Mayari R to reduce the bulk and sections of these arms without sacrificing the necessary strength.

Mayari R has the superior mechanical properties needed for this kind of application. It has a yield-point of 50,000 psi minimum, almost double that of structural carbon steel. In addition, it has an endurance limit of 50,000 psi. Higher working stresses can be used with safety.

Mayari R is used in the as-rolled condition, eliminating any need for heat-treatment. It can be fabricated and welded by any of the methods used for carbon steel.

More information on this versatile grade of steel is readily available. Write or phone for a copy of Mayari R catalog 259.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

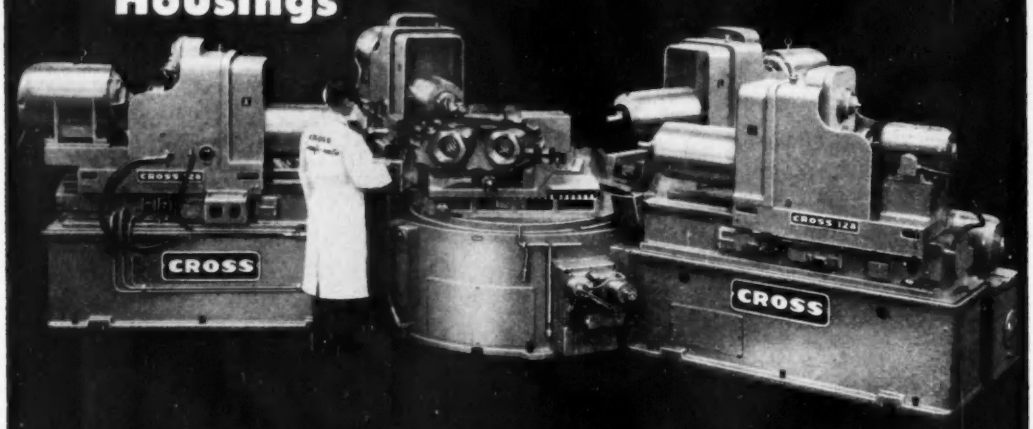
BETHLEHEM STEEL

Heavy-duty hoist-truck bodies built by A. Cresci & Son, Inc., Vineland, N. J. The arms that lift these bodies are made of Mayari R.

Mayari R *makes it lighter... stronger... longer lasting*

Bores Tank Suspension Support Housings

Another Special by Cross



★ Rough and semi-finish bore multi-diameter hole and form two snap ring grooves; index fixture and repeat operation for second bore.

★ Material—Cast Armor. Hardness—Rock. C42.

★ Six pieces per hour (three right and three left hand) at 100% efficiency.

★ 40 horsepower drive motor for each boring spindle.

★ Five-station, fluid motor operated, index table, including one station for loading, three for boring and one for grooving.

★ J.I.C. standard hydraulic and electrical construction with stranded wire.

★ Other features: Hardened and ground ways; hydraulic feed and rapid traverse; pre-set tools; automatic, gravity operated, cam clamping for index table.

Established 1898

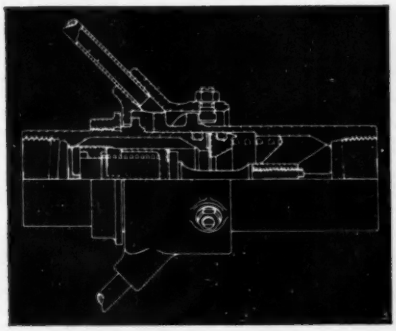
THE CO.

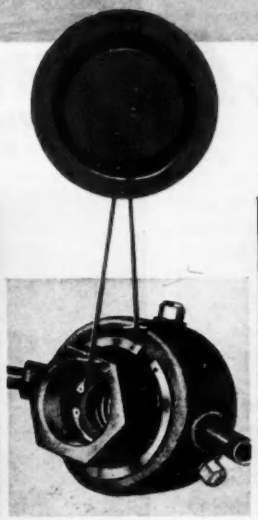
DETROIT 7, MICHIGAN

Special MACHINE TOOLS

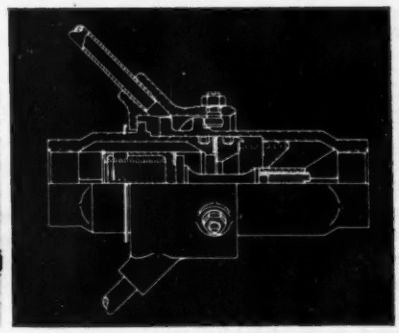
2 TRUARC RINGS ELIMINATE BULKY THREADED RETAINERS ...SAVE 41 MINUTES...$4.02 PER UNIT

OLD WAY Oversize internal and external retainers required costly milling, turning and threading operations. Assembly and disassembly (for inspection and seal replacement) was slow, difficult and expensive. Wall thickness and weight were excessive.





NEW WAY An internal (series 5000) and an external (series 5108) Truarc Ring are set into 2 grooves. Light, strong, economical Truarc Rings simplify assembly, disassembly, maintenance. Unit is smaller, more efficient. Greater accuracy because of positive stop positions!



Sperry Products, Inc., Danbury, Conn., saved 41 minutes in manufacturing and assembly time by using 2 Waldes Truarc Retaining Rings in place of old-fashioned threaded retainers in their self-sealing couplings! With Truarc Rings many tooling operations were eliminated... important savings per unit were made in raw material (1½ lbs. metal), overall size (3/16" diam.), and weight (1 lb.). Unit efficiency was greatly increased!

Redesign with Truarc Rings and you, too, will cut costs. Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better job of holding parts together.

Truarc Rings are precision-engineered... quick and easy to assemble and disassemble. Always circular to give a never-failing grip. They can be used over and over again.

Find out what Truarc Rings can do for you. Send your blueprints to Waldes Truarc engineers for individual attention, without obligation.

USE OF 2 TRUARC RINGS ELIMINATED THESE COSTS

MACHINING:

outer shoulder ring: 15 minutes	$1.12
inner retainer: 20 minutes	1.50
threading: 4 minutes	.30
ASSEMBLY	.13
Total labor savings	$3.05
MATERIAL:	
brass threaded retainers	.97
TOTAL SAVINGS WITH TRUARC RINGS	**$4.02**

For precision internal grooving and undercutting... Waldes Grooving Tool.

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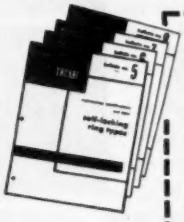

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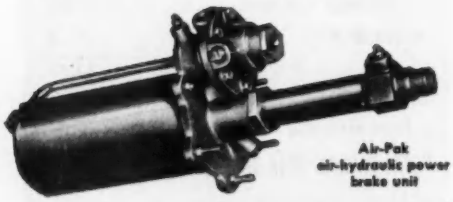
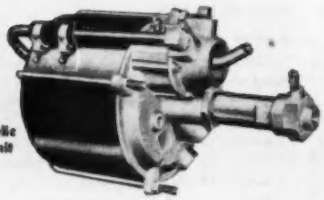


Air-Pak air-hydraulic power brake unit



Hydrovac vacuum-hydraulic power brake unit

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High Spots of This Issue

FOR Free Literature and Information on New Equipment and New Products, use postage-free reply card on page 65.

Automotive Market in Latin America

Our "good neighbors" to the South are buying U. S. automotive equipment in increasing quantities and want more. This rich market and the factors involved in tapping it to best advantage are fully discussed. See Page 34.

Shell Mold Casting Method

In the front ranks of enthusiasts for this new casting technique are now to be found several automotive and aviation manufacturers. First demonstrated in the U. S. two years ago, it has had wide acclaim. Page 42.

Different Cars by the Millions

The individualized treatment given cars as they move down the assembly line is an engineering science all its own. How manufacturers handle an infinite variety of color and equipment orders is reviewed. Page 44.

Plastic Aircraft Development

Planes of plastic, cheaper and easier to build than conventional types, may wing over the horizon in the near future. The long strides which the British have taken toward this goal are described. Page 48.

Army Vehicle Components Rebuilt at Tokyo

The reader is conducted on a tour of the Tokyo Engineering Works, where the mechanized methods of Detroit are often apparent. The Far East Command leans heavily on this facility for automotive equipment. Page 54.

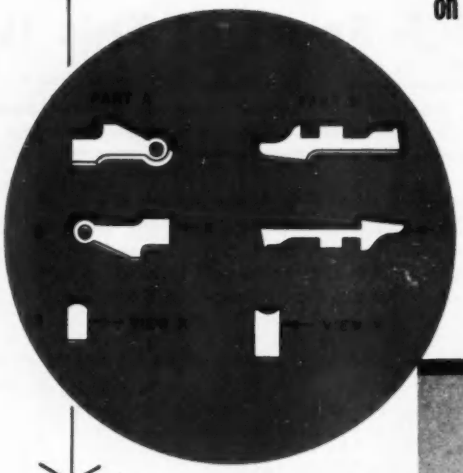
28 New Products Items And Other High Spots, Such As:

New French vehicle for land or water; subcontractors have big part in Martin aircraft production; simplified synchronizer for Clark transmissions; Studebaker saga; the Vampire 10 night fighter; new military vehicles developed in Holland; new type hydraulic press for forming aircraft parts; and Piasecki builds two versions of YH-21 helicopter.

Automotive and Aviation News, Page 17
Complete Table of Contents, Page 3

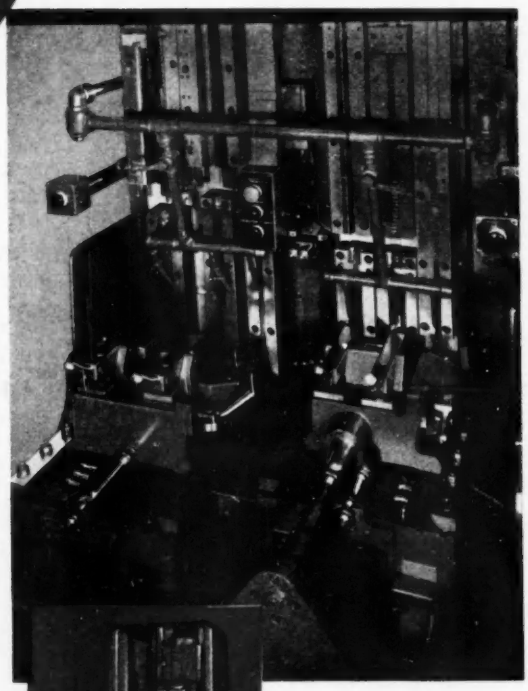
AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

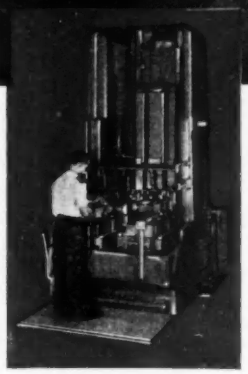
BROACHING TWO DIFFERENT PARTS
...THREE OPERATIONS EACH
on Cincinnati Duplex Vertical



Drawings of two parts broached on the All-Cincinnati equipment illustrated, showing sequence of operations and stock removal.

Part name	Gun parts
Material	Steel forging
Operation	Broach contour complete
Depth of cut	Variable—see drawings
Broaching speed	36 feet per minute
Production	53 per hour, each part
Machine	CINCINNATI No. 5-54 Duplex Vertical Hydro-Broach with complete tooling





Multiple operations on average quantities of small work can often be a stumbling block to production. How one stumbling block was removed by Cincinnati Application Engineers is illustrated here. Two small parts—call them A and B—were costing entirely too much to machine, so they were tooled up for *broaching* on a *Duplex Vertical*. The double ram machine, ordinarily a high production unit, was chosen so that part A could be broached by one ram, and part B by the other. A CINCINNATI No. 5-54 Duplex Vertical Hydro-Broach, illustrated here, two three-station fixtures, and suitable inserts (cutters) complete the equipment, ready for production. ¶ Fixtures are manually operated and the parts progress through three stations from the left- to the right-hand side. Production averages about 53 of each part per hour. ¶ Hydro-Broach features of value in producing work of this type include pre-set cycle control to safeguard the operator; hardened and ground ways, automatically lubricated for long life; clamp and dovetail positioning of broach holders to facilitate changing setups. ¶ Your low production work gets just as good treatment as big volumes at Cincinnati Milling, for we can weigh the advantages of milling and broaching, and offer you the lowest cost method. And if you're not familiar with the new CINCINNATI Duplex Vertical Hydro-Broach Machines with receding tables, write for literature.

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CINCINNATI Duplex Vertical Hydro-Broach. You may obtain complete specifications by writing for catalog No. M-1709-1.

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 106, No. 11 June 1, 1952

No Change in Plymouth Engine Seen for 1953

With all of the activity in new engines in the automobile field, there has been considerable speculation about Chrysler Corp.'s plans for Plymouth. At the moment, it does not appear that a radical engine change is planned for the 1953 model, but there is a possibility that a new power plant will be introduced in 1954.

However, there seems to be little solid support for assumptions currently circulating that the new engine will be a V-8. The best information available is that an overhead valve in-line six is more likely. The decision apparently has not yet been made, though.

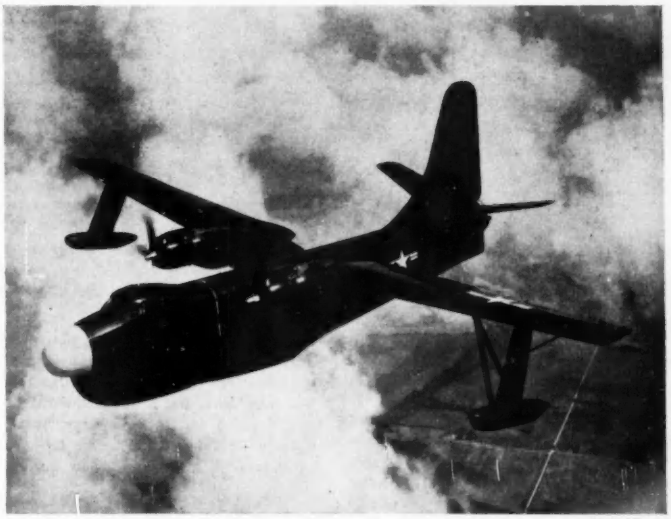
One possibility on next year's Plymouth models is some type of automatic drive. It is currently the only large volume producer not offering an automatic drive, and if competitive compulsion becomes strong enough, Plymouth will probably come up with a unit to meet the need.

Air Force Discloses Details of Giant Jet Super-Bombers

The Air Force recently partially pulled aside the wraps surrounding its two jet-powered, swept-wing bombers, the Convair YB-60 and the Boeing YB-52. Although general exterior details were released, no information as to weight, speed, or other performance data has as yet been announced.

The YB-60 was revealed to be the larger of the two planes with a wing span of 206 ft, a fuselage length of 171 ft, and a tail height of 50 ft, compared with dimensions of 185 ft, 153 ft, and 48 ft, respectively, for the YB-52. Both planes have eight jet engines and are designed for long-range bombing missions.

Although the YB-52 is going into production at the Boeing Aircraft Co. plant in Seattle, Wash., no production plans are known yet for the YB-60.



United Press

DEADLY SUB STALKER

One of the Air Force's newest anti-submarine weapons is this P5M Marlin seaplane. Said to contain the most powerful tactical radar unit of any U. S. aircraft, the plane has a wing span of 118 ft and is 90 ft long. It carries numerous torpedoes, rockets, depth charges, and other weapons for the destruction of undersea marauders.

Reports Indicate Change in Chrysler Styling

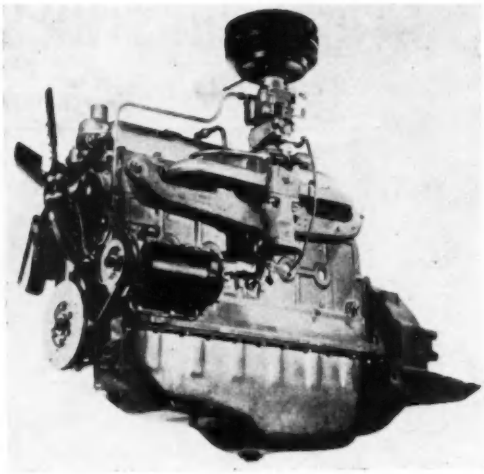
Reports from tool and die sources indicate that Chrysler Corp. divisions will have completely new body styles for 1953. Another possibility for next year's models is a new automatic transmission for which tooling is now being installed at Indianapolis, Ind. It is understood that it will be a torque converter with planetary gearing and reportedly will have the highest torque multiplication of both any torque converter and automatic transmission yet introduced.

Willys Earnings, Sales Seen Highest in History

Willys-Overland Motors, Inc., has reported the largest earnings before taxes for any six months' period in its history. Dollar volume of production and shipments also was the highest on record.

For the six months' period ended March 31, net earnings totaled $3,332,577, an increase of more than 50 per cent over the same period a year ago. Sales during the period totaled more than $150 million, an increase of 53.5 per cent over the corresponding period last year. As of last March 31, Willys' backlog of unfilled defense contracts and civilian deliveries stood at approximately $275 million.

News of the AUTOMOTIVE



NEW GMC 302 TRUCK ENGINE

A new truck engine, recently introduced by GMC Truck & Coach Div. of General Motors Corp., has a compression ratio of 7.2 to 1. The 302 cu in. unit generates 145 hp at 3600 rpm and weighs only 545 lb (dry). Already used as the power plant for the GMC 6 x 6 military truck, it will be installed in the GMC Model 450 and 470 truck series as a successor to the 270 cu in.

Chrysler to Run Detroit Arsenal

Chrysler Corp. has been selected by Army Ordnance to operate the Detroit Arsenal. The company has been notified that negotiations are to be concluded for it to take over the production end of the arsenal at an early date.

Several other companies had previously been asked to submit proposals to operate the plant. According to reliable sources, however, all but Chrysler had withdrawn before the final selection was made. Chrysler excluded from its proposal the current research and development projects now underway at the arsenal as well as the Ordnance national gage and inspection programs.

Automobile Firms Get More Defense Orders

Defense orders are still coming into the automobile industry. Diamond T Motor Car Co. has been awarded an order amounting to more than $45 million for 2857 five-ton trucks and spare parts. Studebaker Corp. has received an additional $20 million increase to its original contract for 2½-ton 6x6 trucks.

Two General Motors Corp. divisions also have been awarded supplemental orders. Cadillac's Cleveland plant has an order for $2 million worth of tank modification kits, while Oldsmobile has been awarded a supplemental order for 3.5 in. rocket parts in the amount of $924,000 to bring its total contracts to more than $30 million.

British May Denationalize Trucking Industry Soon

Convinced that nationalized road haulage is inefficient and costly to the nation, the British government reportedly will revert to free enterprise at an early date. If the opposing political party is returned to power, it will renationalize the trucking industry, according to an official party statement.

The intention apparently is to throw 40,000 vehicles on the market by offering them as self-contained operational units of a variety of sizes with relatively small operators favored. For the time being, licensed operators will be limited to a 25-mile radius. It is expected that the transaction will involve a considerable financial loss, since owner goodwill was confiscated under nationalization.

There is now no goodwill to sell, and to make up this loss a levy on truckers has been proposed. The levy has aroused opposition, as it may be applied to meet the deficit of the nationalized railroads.

There is no assurance that the present 20-mph limit for heavy trucks will be raised to 30 mph. Long-distance trucking, which has virtually been wiped out to favor the railroads, will eventually be restored, but it is not known when this competition will resume.

Vauxhall Production Clouded by Trouble

Vauxhall Motors, Ltd., produced 77,877 passenger cars and trucks and exported 53,271 units during the year 1951. In spite of a broad post-war plan for improvement and plant expansion, the company has not been in a very strong productive position. Activity in 1951 was controlled and dominated by shortage of materials, particularly steels, with the result that production was less than in 1950, and exports were down at a time when the government is calling for increased foreign sales.

Allocations are woefully inadequate to meet the apparent demand for the home market, and domestic deliveries for 1952 have again been cut by more than 40 per cent. For the first time in 14 years it has been necessary to place a large number of workers on a four-day work week and to discharge about 250 employees. Vauxhall has, however, signed contracts for the production of a special military vehicle, which is expected to come off the assembly line in quantities shortly.

Rapid Progress is Made on GM Technical Center

General Motors Corp. is moving along with its Technical Center building program. It has started construction for the main research building, the last of six units in the Research Laboratories group at the Center.

The building will be approximately 690 ft long, 55 ft wide, and will house the engineering, chemistry, and physics laboratory, plus executive offices, auditorium, and technical library. Still under construction in the Research group are metallurgy, mechanical, fuel blending, processing, and turbine test buildings.

AND AVIATION INDUSTRIES

Hudson Light Car May be Delayed

Although not much has been heard about it lately, the new light car planned by Hudson Motor Car Co. still is very much in the works. There are indications, however, that it will not appear by early summer, as had been expected. Reliable reports state that it is a brand new vehicle with new engine, body, and chassis, and will be in the price range of Ford, Chevrolet, and Plymouth.

Greater Use of Aluminum in Automobiles is Seen

The uses of aluminum in passenger cars in the near future were discussed at the recent May meeting of the Detroit Section of the Society of Automotive Engineers by Frank Jardine, manager, Development Div., Aluminum Co. of America. The problems of welding aluminum and the finishing of aluminum parts were covered in discussions by G. O. Hoglund and R. V. Vanden Berg, respectively, also of Alcoa.

Using conservative estimates, Mr. Jardine gave the following outline of the most practical applications of aluminum in automobiles, showing the actual consumption of aluminum in 1950 as well as his estimate of probable consumption in 1954.

Uses of Aluminum in Passenger Cars

	Feasible Aluminum Applications Per Car (lb)	1950 Consumption (lb)	1954 Estimated Consumption (lb)
Pistons	13	60,670,000	65,000,000
Cylinder heads	44	4,570,000	23,400,000
Cylinder blocks & crankcases	65		10,500,000
Clutch housings	5	1,330,000	5,000,000
Torque converters	22	16,670,000	25,000,000
Timing gears	2	667,000	3,000,000
Radiators	13		15,000,000
& Wiring	2.5		4,000,000
Carburetors and fuel pumps	2.5	1,330,000	10,000,000
Valve covers & manifolds	10	667,000	3,000,000
Body Trim	5	3,330,000	10,000,000
Bearings	0.3		1,500,000
Brakes	24	2,000,000	7,000,000
Tubing	3		1,000,000
Miscellaneous	3	6,667,000	9,000,000
TOTALS	214.3	97,901,000	201,400,000

It will be noted that Mr. Jardine conservatively anticipates an average usage of 214.3 lb of aluminum per car by 1954. If a production of five million cars in '54 is assumed, consumption would be approximately 1,071,500,000 lb or 535,750 tons. However, due to the current expansion in productive capacity of the aluminum industry in the U. S. and Canada, the tonnage that may be consumed by car manufacturers will still account for only a small percentage of potential aluminum production by 1954.

Chrysler Drive Takes Oil from Crankcase

Chrysler Corp. has introduced a modified version of its automatic drive on the De Soto V-8 and Chrysler Six. The unit is essentially the same mechanically as the drive now used on the Chrysler V-8, but differs in the important respect that oil supply for the torque converter is taken from the crankcase of the engine through connecting galleries. The new drive is called the Fluid-Matic.

Knapp Wins Rights to Lead Patents

World-wide rights for the commercial development of all of its inventions pertaining to lead have been awarded to Knapp Mills, Inc., for a period of 18 years by American Viscose Corp. The contract is said to involve six issued patents and patents pending and five further developments involving lead for which patent protection would be sought.

Goss Will Build Tools for Aircraft Industry

Goss Printing Press Co. has started construction of an addition to its new plant at Cicero, Ill., to be used for the manufacture of large special machine tools for the aircraft industry. The addition is expected to cost about $1.7 million and is scheduled for completion in October.

The company's new plant, recently completed at a cost of $4 million, is being used for defense orders and for heavy work on presses in civilian use. When the new addition is completed, it will bring the total manufacturing floor space to 600,000 sq ft.

New Type Steering Aid Under Study

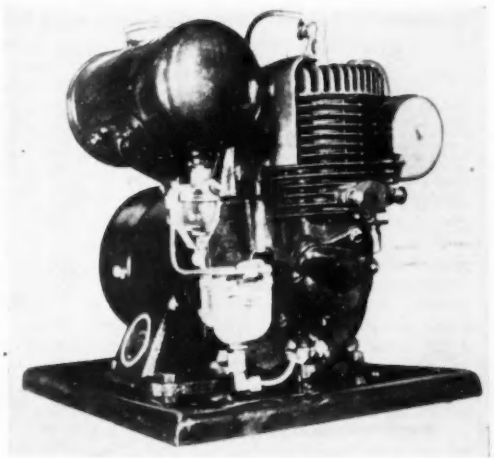
It is reported that a new development in power steering is on the way. One company now producing a power steering unit is said to be working on a somewhat different version, but details are still confidential.

Tinnerman Licensee Opens Canada Plant

A new plant for the manufacture of fasteners in Canada was opened recently by Dominion Fasteners, Ltd., in Hamilton, Ontario. The firm is a licensee of Tinnerman Products, Inc.

TWO-CYCLE ENGINE

Called a "slave" engine because it is attached to the unit which it drives, this new two-cycle engine has been developed by Plan-O-Mill Corp. The need for a crankshaft is eliminated by utilizing the shaft of the driven unit. The engine has no carburetor, but uses a float bowl from which fuel pre-mixed with oil in a 48 to 1 ratio is delivered to the main bearing. Cylinder head and barrel, crankcase, and main bearing are a one-piece casting.



News of the AUTOMOTIVE

Numerous Military Uses Open to Metal Powders

At the Eighth Annual Meeting of the Metal Powder Association, held in Chicago, Ill., recently, many of the technical discussions centered about the uses of metal powder parts for military applications.

Although Ordnance applications have been under consideration for a long time, acceptance of metal powders for major elements such as rotating bands has been approached with considerable caution. Indications are that acceptance will be stepped up in the near future to permit the use of powdered iron rotating bands on shells up to at least 105 mm, thus saving considerable copper.

It was reported that Ordnance is also using metal powder parts in experimental production for fuse components, proximity fuses, and 20 mm practice projectiles. There has likewise been some success with drawing 50-caliber cartridge cases from powder iron slugs by using the same equipment as that employed in making steel cartridge cases.

Finally, it was revealed that another wide field of application for metal powder parts is that of gas turbines. A great deal of work is said to be under way to develop special materials designed to replace stainless steel for turbine wheels and other parts. The most promising materials for high-temperature use are reported to be refractory compounds, ductile titanium, and titanium carbides, among others.

JIC Discusses Effects of Machine Tool Order

An emergency meeting of the Joint Industry Conference (JIC) on electrical standards for industrial equipment was held in Detroit, Mich., recently to discuss the effects of a proposed National Production Authority order which would prevent the specification of JIC electrical standards for machine tools and other metalworking equipment.

Order Requirements

Users would thus be compelled to accept those built to electrical standards of the National Machine Tool Builders Association exclusively. One of the penalties to be imposed by NPA, if the order should go into effect, would be that any customer refusing to accept delivery of a machine tool because of conflict over electrical specifications would lose his right to the machine, and delivery would then be made to the next customer of the list.

Debate and Recommendations

A prepared discussion of the advantages of JIC standards from the standpoint of industrial manufacturers in the matter of safety, preventive maintenance procedures, and reduction of breakdowns was presented by a panel of six automobile industry representatives. The replies to a questionnaire, which had been circularized among electrical equipment suppliers, were then introduced to show that, in the main, accessory equipment meeting JIC standards now was readily available and need not hamper the machine tool builder in meeting delivery schedules.

In conclusion, it was recommended that the pending NPA order M-105 be rescinded in the interest of expediting the defense program by permitting the users and suppliers to resolve their differences through meetings.

Drawbacks and Compromises

It should be noted, however, that a complete swing to JIC standards, as has been noted in many makes of machine tools in recent years, often requires some altering of basic designs. Consequently, many makes of machines, particularly those not used extensively in automobile production, are not prepared to comply with JIC standards especially with the pressure of shipments for defense needs. In such cases, meetings with JIC may make possible reasonable compromises of benefit to all concerned.

It is reported that consideration is being given to a proposal that NPA amend the order, if it is placed in effect, in such a way as to permit the specification of JIC electrical standards by automobile users, providing this does not delay delivery of a specific defense machine. If the order is not squashed, such an amendment may afford a satisfactory compromise.

Singer SM 1500 Car Offered to Public

The plastic-bodied Singer SM 1500 car may now be purchased by the general public, according to a recent

1952 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1952 Three Months' Totals

MAKE	March 1952	February 1952	March 1951	THREE MONTHS Units 1952	Units 1951	Per Cent of Total 1952	Per Cent of Total 1951
Chevrolet	20,530	19,536	30,170	59,521	86,337	32.66	34.12
Ford	19,035	13,206	21,356	41,226	61,272	22.61	24.23
Dodge	7,276	7,306	9,038	22,561	28,340	12.38	11.20
International	7,400	6,880	8,292	20,930	24,104	11.48	9.53
G.M.C.	8,224	5,971	8,702	18,164	25,610	9.96	10.13
• Studebaker	2,246	2,137	2,492	6,497	8,146	3.56	3.22
White	950	791	1,075	2,689	3,378	1.47	1.34
Willys Truck	841	795	1,313	2,533	4,315	1.39	1.71
Willys Jeep	629	594	621	1,804	2,015	.99	.80
Mack	532	528	1,068	1,596	3,094	.88	1.22
Diamond T	345	292	456	925	1,242	.51	.49
Divco	309	233	326	796	1,080	.44	.43
Reo	272	236	366	747	1,126	.41	.45
Autocar	120	147	235	409	571	.22	.23
Brockway	144	137	269	398	770	.22	.30
Federal	78	57	94	187	306	.10	.12
Kenworth	62	70	55	179	205	.10	.08
Pontiac	52	47	51	173	185	.09	.07
F.W.D.	44	34	60	154	148	.08	.06
Sterling	25	4	33	58	94	.03	.04
Peterbilt	10	26	49	55	96	.03	.04
Misc. Domestic	218	245	126	652	433	.36	.17
Misc. Foreign	22	14	20	56	59	.03	.02
Total—All Makes	63,364	59,285	86,287	182,310	252,926	100.00	100.00

* Based on data from R. L. Polk & Co.

announcement by Vaughan Motors, Inc., U. S. distributor for Singer. The purchase price is $2995.

The chassis and engine of this car are manufactured by the Singer factory in England. The body, molded in one piece from vibrin polyester plastic reinforced with glass fiber, is being made in the U. S. at assembly plants in New York, California, and Florida.

AMA Booklet Marks Car Essentiality

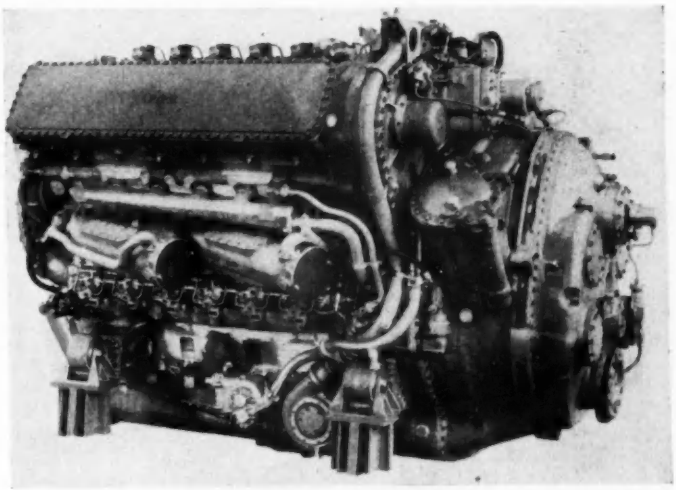
The Automobile Manufacturers Association has fired another salvo in its continuing battle to drive home to the public the essential role of automobiles in the nation's economy. A new publication, just off the press and entitled "The Work Cars Do," points out that nearly 17 million automobiles nine years old or older are on the road today and that their average mileage is more than 73,000 miles.

Other facts, based on a recent national survey, show that: nearly 70 per cent of the average motorist's driving is for necessary purposes; more than half of all employed persons use passenger cars for earning a living; 80 per cent of those persons who use cars for reaching their work do so five days a week or more; and the scrappage rate of worn-out cars is nearly twice as high as in prewar years.

Sawyer to Form Highway Advisory Committee

Secretary of Commerce Charles Sawyer has informed President Truman that he will soon establish an advisory committee of business and industrial executives to examine the problem of the nation's high highway accident rate and to recommend measures for reducing it.

As general chairman of the President's Highway Safety Conference, to which he was appointed in April, Secretary Sawyer also reported that he is calling a meeting of the Conference in Chicago, Ill., on Oct. 17 and 18. The representatives of his new advisory committee as well as officials and supporting groups from each of the 48 states will be invited to the Chicago conference.



"DELTIC" DIESEL ENGINE

This photograph of the new "Deltic" Diesel engine (see p. 18 of May 15 issue of this publication), shows its three-crankshaft, opposed-piston design. Developed by D. Napier & Son, Ltd., for the British Navy, the two-stroke unit is undergoing sea trials.

Lifting of Credit Curbs Seen as Industry Boon

Automobile companies and dealers seem optimistic about a sales upturn as a result of the recent lifting of all credit restrictions. Almost immediately many automobile finance companies extended time payments on new cars and used cars less than three years old to 24 months and 18 months, with down payment remaining at one-third.

On used cars older than three years, the down payment remains at one-third, and time payments are limited to 18 months. It still is too early to tell, however, whether the eased credit curbs will stimulate business as much as some dealers expect.

1952 Chevrolet Soap Box Derby Set for Aug. 10

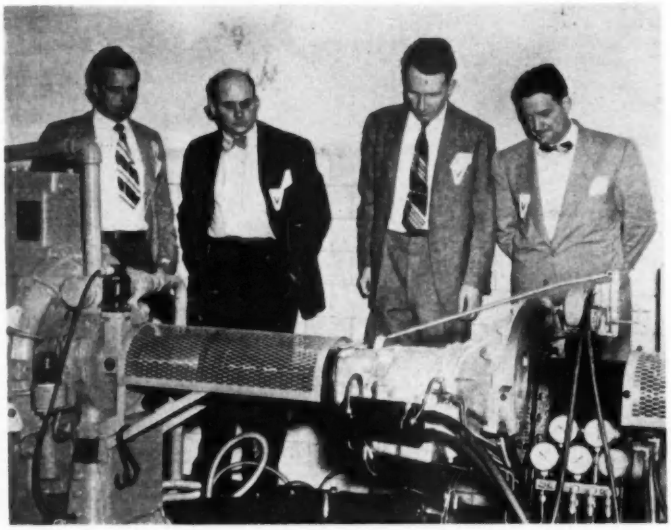
Chevrolet Div. of General Motors Corp. will hold its Soap Box Derby in Akron, O., Aug. 10, and this year will offer the largest prize list in the history of the event. As in the past, the national champion will receive a four-year $5000 scholarship. The second place winner will receive a Chevrolet Styleline sedan equipped with Powerglide. Other prizes range from motion picture equipment to special tool sets. Entrants will be local champions from 166 communities in the U. S., Alaska, Canada, and the U. S. sector of Germany.

Steady Gain Forecast in Motor Fuel Octane

The oil industry is moving rapidly to supply higher octane fuels during the next few years to meet the needs of higher-compression engines. By 1955 the average octane value of premium fuels is expected to stand at about 96, compared with the present level of about 90, according to the Refining Div. of the American Petroleum Institute. Regular fuels are expected to climb to approximately 88 octane, compared with 83 today.

Some oil engineers recently stated that even though octane ratings have increased 8.5 points since 1940, regular gasoline now meets the octane needs of only 55 per cent of all cars, and premium fuel only 75 per cent of high-octane-requirement engines.

News of the AUTOMOTIVE



ESSO TRANSMISSION TEST STAND

Several members of a group of newsmen, who recently toured the Esso Research Center of Standard Oil Development Co. in Linden, N. J., examine a hydraulic transmission test stand. The unit enables the evaluation of hydraulic transmission fluids under all types of operating conditions in actual transmissions. Basic equipment comprises a 500-hp, 3600-rpm driving motor and a 750-hp, 1000 to 3500-rpm dynamometer.

Machine Tool Authority Transferred to NPA

Authority to allocate all idle military-owned machine tools and other idle production equipment and to maintain the Central Inventory of such equipment has been transferred by the Dept. of Defense to the National Production Authority. The transfer is said to be an important step toward relieving the production difficulties of defense contractors.

U. S. Steel Releases Hardening Patent

U. S. Steel Corp. recently announced that a patented method for predicting in advance the hardening characteristics of steel compositions has been released to the public. It is said that the patent will enable the production of types of steel that will exactly suit diverse civilian and defense assignments.

Conversely, the method reportedly makes possible the design of steels of required hardening characteristics from the available supply of steel-making materials. The patent was issued July 3, 1951, in the name of Marcus A. Grossmann, and assigned to U. S. Steel Corp., where Dr. Grossmann is adviser in research planning.

GM Starts Dual Plant in Texas

General Motors Corp. has started construction of its new dual-purpose plant at Arlington, Tex., for the simultaneous production of aircraft for the Navy, and Buick, Oldsmobile, and Pontiac cars.

The plant will be operated by the B-O-P Div. and will be so arranged that, in the event of greater military need, most of the space designed for automobile output could also be converted to aircraft production in a matter of a few days. On the other hand, if military needs are less than now expected, car production could be expanded in the aircraft space.

P & W Departments Set for New Plant

Eleven manufacturing departments and the supporting service departments required to maintain production operations are scheduled to move into the new multi-million dollar North Haven, Conn., branch plant of Pratt & Whitney Aircraft Div. of United Aircraft Corp.

Construction of the 700,000 sq-ft plant was begun last year and at peak operation will employ about 5000 people.

Together with the enlarged Hamilton Standard Div. plant adjoining P&WA's East Hartford, Conn., plant which it will acquire shortly, when Hamilton Standard moves to its new plant at Bradley Field, Windsor Locks, Conn., the Engine Div. of United Aircraft Corp., will gain about a million additional sq ft of manufacturing space. This will be used for the production of both piston and jet engines.

Borg-Warner Completes New Furnace Building

Erection of a new building for housing two new 18-ton capacity electric steel melting furnaces for the Chicago plant of Ingersoll Products Div. of Borg-Warner Corp. is nearly completed The new furnaces reportedly will help assure a steady supply of steel and will also make it possible to control the quality of steel to exact requirements.

Fairless to Receive John Fritz Medal

Benjamin F. Fairless, president of U. S. Steel Corp., was recently selected to receive the 1953 John Fritz Medal and Certificate as "Champion of the American Free Enterprise System for Notable Industrial Achievement in the Production of Steel."

The medal was established in 1902 and is perpetuated by the American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Mechanical engineers, and American Institute of Electrical Engineers. It is awarded as a joint honor for scientific or industrial achievement in any field of pure or applied science.

AND AVIATION INDUSTRIES

Anderson Co. Wins Patent on Curved Glass Wiper

After 6½ years of interference litigation, Anderson Co. was recently granted a patent on its windshield wiper blade designed for use with both curved and flat windshields. The original application for the patent was filed Dec. 13, 1945. The patent as issued carries two sheets of drawings and 31 claims allowed by the patent office. Anderson does not expect to issue any licenses to others to manufacture and sell for replacement purposes wiper blades falling anywhere within the broad framework of the protection provided by the patent.

Chrysler Has 35,000 Back Orders for V-8

Chrysler Div. of Chrysler Corp. has revealed that it has back orders from dealers for 35,000 cars equipped with its overhead valve V-8 engine. The company says that customer preference for the V-8 is very pronounced, with April shipments 23 per cent higher than March. In the first four months of this year, shipments of cars equipped with the V-8 engine were 85 per cent higher than in the same period a year ago.

Firestone Develops "Dry-Ship" Battery

Firestone Tire & Rubber Co. has developed a new storage battery which is shipped to dealers in a dry state with the battery acid added at the time of purchase. As a result, the batteries are fresher, according to the company. The separators are made of a glass fibre composition material, and acid is shipped in a separate plastic container with each battery.

Better Brakes, Drivers Seen Trucking Needs

An improved braking system and better drving training programs are necessary if the trucking industry is to cut down highway accidents involving tractor-trailer combinations, according to J. George Oetzel, engineering vice-president of Warner Electric Brake & Clutch Co.

The Warner executive went on to say, in a recent speech, that new developments in braking had increased the safety margin on the highways considerably. He cited the growing trend for truck fleets to equip tractors and trailers with two independent braking systems—air on the tractor, and electric on the trailer.

Reduced Volume Cuts Packard Earnings

A low volume of production and increasing costs cut earnings of Packard Motor Car Co. in the first quarter of this year to $1,288,879, compared with $2,499,973 during the same period a year ago.

One factor, responsible for the drop, according to the company, was the prolonged spread between the prices of Packard's new models and those of competitors, which were held down because of price control, and which were not overcome until competition brought out new models after the first of this year. Sales for the three months' period totaled more than $43.8 million, against $58.1 million a year ago.

Vehicle Prices Move in Narrow Range

There have been several minor price readjustments in the automobile industry recently, but, with one exception, there is no indication of competitive compulsion.

Chevrolet cut prices by $12.78 to $19.26 to compensate for a decreased use of conversion steel. On the other hand, Chevrolet truck prices were increased $11.35 to $3.65 under provisions of the Capehart amendment.

Dodge reduced truck prices $15.50 to $60 because of reduced use of conversion steel. The cuts are equal to increases taken last fall due to higher steel costs. The only frankly competitive price cut has been made by Kaiser-Frazer Corp. on the Henry J.

Fowler Takes Over as Head of DPA

Henry H. Fowler, head of the National Production Authority, has taken over the job of Defense Production Administrator from Manly Fleischmann who resigned May 31. Fowler will serve as head of both agencies under the present set-up.

1952 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the March 1952 Total

MAKE	March 1952	February 1952	March 1951	THREE MONTHS Units 1952	Units 1951	Per Cent of Total 1952	Per Cent of Total 1951
Chevrolet	65,557	66,009	110,166	198,356	313,499	21.56	22.17
Ford	63,011	40,028	68,487	142,854	239,115	15.53	16.88
Plymouth	31,494	33,841	52,175	105,713	137,517	11.49	9.71
Buick	24,212	23,821	42,969	71,531	117,602	7.78	8.30
Pontiac	18,608	17,685	33,468	58,655	98,980	6.38	6.99
Dodge	17,631	17,236	29,379	51,234	78,183	5.57	5.52
Oldsmobile	17,743	16,566	29,886	50,140	75,550	5.45	5.33
Studebaker	13,410	15,090	18,561	43,979	55,321	4.78	3.91
Mercury	14,000	11,960	21,521	38,259	65,175	4.16	4.60
Nash	9,201	9,662	11,619	27,856	32,820	3.03	2.32
Chrysler	9,026	9,177	15,967	27,727	39,963	3.01	2.82
De Soto	7,784	6,523	10,212	20,906	29,333	2.27	2.07
Cadillac	6,916	6,364	8,985	17,753	26,810	1.93	1.89
Hudson	6,074	5,845	12,124	17,018	31,483	1.85	2.22
Packard	5,807	4,423	7,088	14,439	20,222	1.57	1.43
Kaiser	3,059	2,694	6,423	8,561	17,335	.93	1.22
Henry J	2,342	1,979	6,592	6,647	15,868	.72	1.12
Willys	2,607	2,186	2,494	6,545	7,097	.71	.50
Lincoln	2,049	1,214	2,228	4,205	7,455	.46	.53
MG (British)	410	398	.....	1,175	.....	.13	.....
Austin (British)	374	388	292	1,168	1,014	.13	.07
Hillman (British)	353	290	.....	877	.....	.10	.....
British Ford	273	274	198	852	738	.09	.05
Crosley	295	247	597	807	1,627	.09	.11
Jaguar (British)	209	177	.....	568	.....	.06	.....
Allstate	86	136	.....	282	.....	.03	.....
Misc. Domestic	196	425	79	665	287	.07	.02
Misc. Foreign	331	281	1,079	943	3,170	.10	.22
Total—All Makes	322,857	295,479	512,599	919,715	1,416,162	100.00	100.00

* Based on data from R. L. Polk & Co.

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Three Months' Retail Car Sales Valued at $1,897,000,000*

Price Group	March 1952 Sales Units†	% of Total	March 1952 Dollar Volume Dollars	% of Total	Three Months 1952 Sales Units†	% of Total	Three Months 1952 Dollar Volume Dollars	% of Total
Under $2,000	174,892	54.51	$311,041,318	46.00	493,846	54.04	$867,874,911	45.76
$2,001 to $2,500	92,124	28.72	205,186,447	30.35	296,815	32.48	656,049,195	34.75
$2,501 to $3,500	39,129	12.20	105,960,974	15.67	90,260	9.88	248,895,886	13.12
Over $3,500	14,654	4.57	53,988,886	7.98	32,863	3.60	120,900,955	6.37
Total	320,799	100.00	1676,177,625	100.00	913,784	100.00	$1,896,720,947	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.

†—New registrations of American made cars only. Does not include imported foreign cars.

Possible Steel, Copper Woes Dim Auto Picture

The automobile industry at the moment is facing a great deal of uncertainty about future supplies of materials as a result of recent developments in steel and copper.

Possible Steel Trouble

There had been reports indicating possible relaxation or even outright removal of materials controls on steel in the fourth quarter. However, the threat of another steel strike has thrown the picture into confusion.

Other unknown factors are whether construction for the military program is nearing completion and when the full impact of defense production will be felt. The program has been lengthened out, but even so, due to the quantity of facilities that are being prepared, the drain on materials could be substantial if the military elects to build at anywhere near the rate for which facilities are being tooled.

A steel strike could throw all plans for decontrol of that industry into the discard, or at least delay them by several months. Currently, most automobile companies seem to be fairly well stocked with steel, but any interruption in the supply chain would be felt sooner or later.

Another consideration is what Congress may do with the Defense Production Act. It is expected that controls will be extended, but provisions may be inserted compelling control agencies to institute certain relaxation measures.

The Copper Question

Copper is a more immediate problem and, unless some provision is made to borrow from the national stockpile, the effect of the ban by Chile on shipments to this country is likely to be felt some time in June. In essence, Chile elected to withdraw from its agreement to sell 80 per cent of its copper output to the United States at 27½ cents a lb, or three cents above the domestic level. There is as yet no indication as to what Chile will demand in the way of a price concession.

There also are disturbing reports that nickel is becoming increasingly critical. It is understood that NPA has considered the possibility of cutting still further or eliminating entirely the use of nickel in bumpers, but to date no action has been taken.

Bright Spots in Picture

On the other hand, if a settlement is effected in the steel industry without a strike, chances are bright that the metal will be fairly free of controls by the end of this year. The steel industry has submitted a proposal for gradual decontrol, and it is reported to have received some consideration from NPA.

At the moment, however, the automobile industry is pretty confused because there are too many factors involved over which it has no control. Nonetheless, production prospects are fairly bright for the rest of this year, provided no major interruption of steel or copper occurs.

Auto Thefts Showed Rise During 1951

In its recent annual crime bulletin, the Federal Bureau of Investigation disclosed that automobile thefts increased 15.3 per cent in the U. S. during 1951, with an average of 540 a day. Automobiles also headed the list of stolen property.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	March 1952	February 1952	March 1951	Three Months 1952	Three Months 1951	Per Cent Change: Mar. over February	Per Cent Change: Mar. over Mar. 1951	Per Cent Change: Three Months 1952 over 1951
1	New England	18,887	15,791	30,373	50,555	80,017	+19.61	−37.82	−36.82
2	Middle Atlantic	60,771	50,968	100,267	163,871	254,694	+19.23	−39.39	−35.66
3	South Atlantic	38,208	35,876	57,372	116,496	171,790	+ 6.50	−33.40	−32.19
4	East North Central	87,115	78,384	140,349	240,336	366,934	+11.14	−37.93	−34.50
5	East South Central	16,044	13,622	26,719	44,548	69,605	+17.78	−39.95	−36.00
6	West North Central	31,093	28,734	49,190	92,212	142,122	+ 8.21	−36.79	−35.12
7	West South Central	26,356	30,459	39,028	86,352	131,605	−13.46	−30.69	−34.39
8	Mountain	10,461	10,060	17,632	29,476	48,879	+ 3.99	−40.67	−39.70
9	Pacific	33,920	31,585	52,669	95,869	150,516	+ 7.39	−35.60	−36.31
	Total—United States	322,857	295,479	512,599	919,715	1,416,162	+ 9.27	−37.02	−35.06

States comprising the various regions are:—Zone 1; Conn., Me., Mass., N. H., R. I., Vt.—Zone 2; N. J., N. Y., Pa.—Zone 3; Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4; Ill., Ind., Mich., Ohio, Wisc.—Zone 5; Ala., Ky., Miss., Tenn.—Zone 6; Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7; Ark., La., Okla., Tex.—Zone 8; Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9; Cal., Ore., Wash.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Nash Motors of Canada, Ltd.—Thomas S. Adams has been made general manager.

Packard Motor Car Co.—James J. Nance has been elected president and general manager.

Federal-Mogul Corp. —E. Olney Jones was recently elected senior vice president and secretary.

Federal-Mogul Corp. — **Samuel E. MacArthur** was recently elected treasurer, while **Gordon J. LeBrasse** is now acting director of research.

Westinghouse Air Brake Co.—**W. Lyle Richeson** has been elected vice president.

U. S. Steel Corp.—**Benjamin F. Fairless** has been named chairman of the board, succeeding **Irving S. Olds**, retired. He continues as president also.

Chrysler Corp.—**Walter J. Simons** has been appointed assistant treasurer.

Fairchild Engine and Airplane Corp., Fairchild Aircraft Div.—**Arthur D. Jairett** is now manager of the Tooling Dept. **Lorne S. Waddell** has been appointed assistant public relations manager.

Laclede Steel Co.—**J. M. Wilke** is now a vice president and director. He is succeeded as general manager of sales by **Harold R. Kilpatrick.**

Aluminum Co. of America—**Frederick C. Stakel** was recently named advertising manager.

Chrysler Corp.—**John von Rosen** has been appointed staff plant engineer, succeeding **Harry S. Wells**, retired.

Packard Motor Car Co.—**Hugh J. Ferry** has been elevated to chairman of the board and continues as treasurer.

Linde Air Products Co.—**Thomas D. Cartledge** has been named president.

Bakelite Co.—**Howard S. Bunn** is now president.

Vanadium Corp. of America — Harry E. Orr is now assistant vice president and manager of engineering sales.

Dodge Manufacturing Corp.—**Fred J. Ebeling** has been appointed general sales manager.

Vanadium Corp. of America—**John B. Girdler** has been named sales manager.

Budd Co.—**Robert F. Lukenbach** is now safety director.

Garrett Corp.—**W. C. Whitehead** is acting general manager.

Norton Co. — Wallace L. Howe has been named director of research and development.

E. W. Bliss Co.—F. J. de Lorme has been appointed secretary and assistant treasurer.

(*Turn to page* 112, *please*)

Necrology

Elroy J. Kulas, 72, president of Midland Steel Products Co., died May 13, in Gates Mills, O.

George C. McClure, 46, executive vice president and general manager of Hercules Steel Products Corp., died April 26, in Galion, O.

Wendell H. Welch, operations manager of the Export Div. of Chrysler Corp., died May 11, in Detroit, Mich.

John B. Tower, 70, former assistant to the vice president and general manager of the International Div. of U. S. Rubber Co., died May 5, in New York City, N. Y.

James L. Browne, 66, New York City traffic manager for General Motors Corp., died May 14, in New York, N. Y.

Warren L. Ward, 64, senior vice president of Russell, Burdsall & Ward Bolt and Nut Co., died April 29, in Port Chester, N. Y.

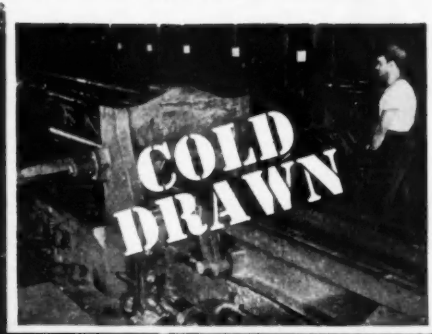
Theodore Zollner, 74, owner of Zollner Machine Works, died April 25, while on a plane trip.

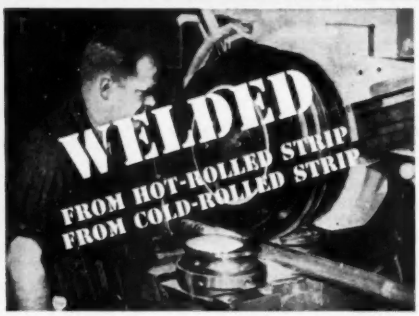
William P. Mimnagh, 57, sales manager of the Automotive and Defense Fabrics Divs. of Sidney Blumenthal & Co., Inc., died May 8, in Flushing, N. Y.

Let's take a

CLOSER LOOK

at TYPES of Tubing





Different in surface finish. Different in dimensional tolerances. Different in machinability. Different in cost. Once you have determined to simplify fabrication of hollow parts with versatile seamless or welded tubing, be sure you're using the *right type* for the job at hand. If you're a long-time tubing user, review all types available to *know* that you're getting the most for your money. Each type has its place—ONE type is best for *your* specific requirement.

The B&W Technical Staff is always ready to cooperate with you in the selection of the proper carbon, alloy, or stainless tubing for your job. Their aim is to help you avoid difficult fabricating problems, eliminate rejects, and save production time and costs.

If you have a specific tubing requirement, tell us end-use, OD, ID, size of finished part, method of chucking and sequence of machining operations, description of finished part, finishing procedure—welding, brazing, plating, heat-treating, carburizing, nitriding, special dimensional accuracy if required, and type of finish desired. Put your problem up to Mr. Tubes—your B&W Tube Representative.

New Bulletin TB-340 is a compact guide to mechanical tubing possibilities, and well worth writing for.

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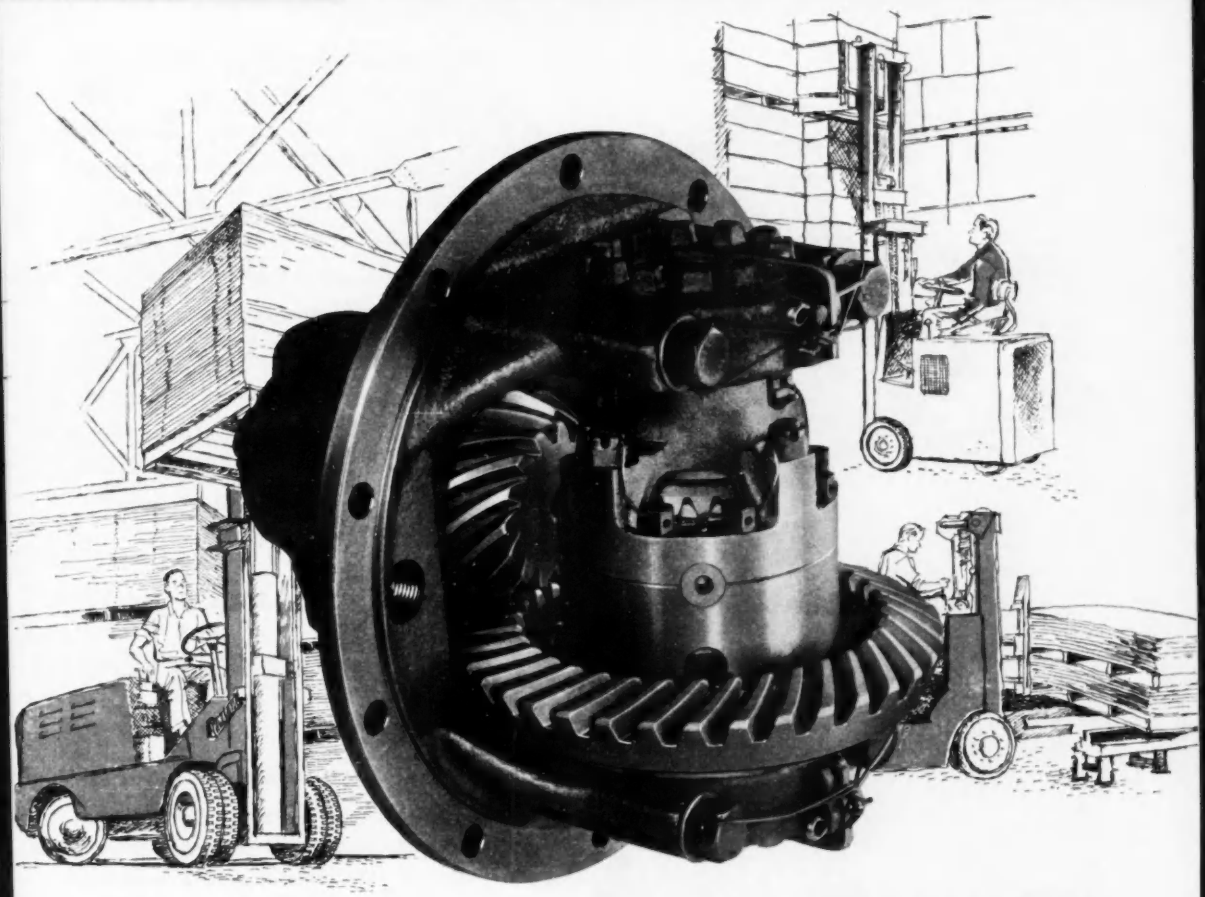

Muscle for America's favorite WORK HORSE

A great development of all-round usefulness to American industry is the fork lift-truck. Today, these swift, efficient machines are pacing the flow of materials in almost every American industry.

In thousands of fork lift-trucks you'll find transmission and differential assemblies made by Automotive Gear Works, Inc. Few gears of any type are exposed to such constant, heavy-duty use. This is particularly true now with increased three-shift production; with trucks working on every kind of flooring and terrain, rough or smooth, indoors or outdoors; and often handling loads greater than recommended capacities. Even under these circumstances "Double Diamonds" are providing dependable, trouble-free "muscle" for hosts of these hustling work horses.

The fact that "Double Diamond" Gears are preferred by leading fork lift-truck manufacturers may suggest the advisability of calling in a "Double Diamond" engineer when you next need gears of the many types we manufacture.

DOUBLE DIAMOND TRADE MARK GEARS

AUTOMOTIVE GEAR WORKS

RICHMOND, INDIANA

FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS

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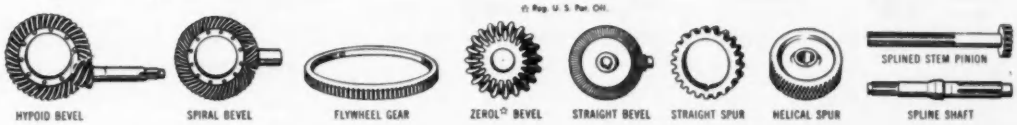

MODERN MASS PRODUCTION depends on a constant flow of component parts. Parts that once specified, can be forgotten. Dependability of supply, quality and exact tolerance must be taken for granted. That is how Thompson Products has earned its position as a leading source of precision parts for cars, buses, trucks, tractors, and industrial engines.

Thompson engineering and Thompson production skills have been sharpened by the production of jet engine, radar and other defense equipment parts of almost unbelievable complexity, made to the closest tolerances known to industry.

For engine performance you can take for granted: *count on* Thompson

All the techniques and skills gained are applied to other products, such as the cylinder sleeves illustrated, piston pins, valve seat inserts and U-Flex piston rings. This means that every Thompson product assures maximum performance and dependability.

If you need better engine products from a supplier you can depend on, write or phone Special Products Division, Thompson Products, Inc., 2196 Clarkwood, Cleveland 3, Ohio. You'll soon learn what leading manufacturers have known for 50 years—*you can count on Thompson.*

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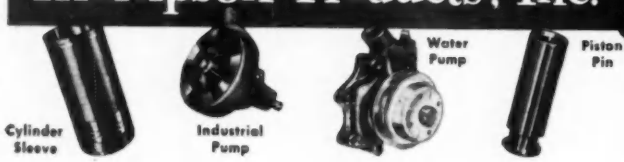

THE BASSET HOUND, a hunting dog, is famous for his keenness of scent. The ears are long enough to fold over the tip of the nose and heavy dewlaps hang from a short powerful neck. The short legs are capable of tireless action.

"Pedigree" is a Fancy Name for "Quality" . . . in Bassets or in Boxes

AND in both cases, it's earned by knowing and controlling every step in development, right up to the finished article.

UNION traces the ancestry of its corrugated containers all the way back to Union-owned forests . . . controlled through every step of manufacture in Union mills (largest in the world) and right up to the shipping of Union boxes to your plant.

That earns a pedigree for Union boxes, because you *know* you can depend on every shipment being up to the same high standards. You can reduce breakage, pilferage, returns.

Union Carbide and Carbon agrees, and ships its nationally known Prestone Anti-Freeze all over America in Union's *pedigreed* boxes—just as hundreds of other famous firms do.

TRADE MARK UNION

Dependable Packaging Since 1874

UNION Corrugated Containers

UNION BAG & Paper Corporation

Principal Offices: WOOLWORTH BLDG., NEW YORK 7, N. Y.

Corrugated Container Plants: **SAVANNAH, GEORGIA • CHICAGO, ILLINOIS • TRENTON, NEW JERSEY**

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By sealing the cooling system and raising the boiling point of the coolant, the Eaton pressure relief cap permits engines to operate in a more efficient and more economical temperature range without boiling away water or anti-freeze; provides for smoother engine performance, better lubrication, quicker warm-up, improved heater operation. In heavy-duty service, at high altitudes, or in extremely warm climates, this is an important safeguard against possible engine damage due to loss of coolant through evaporation. It also prevents loss of coolant due to surge. With a sealed cooling system vehicles can be designed with smaller radiators at considerable saving in cost.

Eaton offers the advantage of a single source of supply for pressure cap and filler-neck requirements; eliminates divided responsibility; assures positive mating of cap and neck; saves engineering and purchasing contact time. Eaton engineers will welcome an opportunity to work with you in developing the most efficient and economical closure—standard or pressure type—for your cooling systems.

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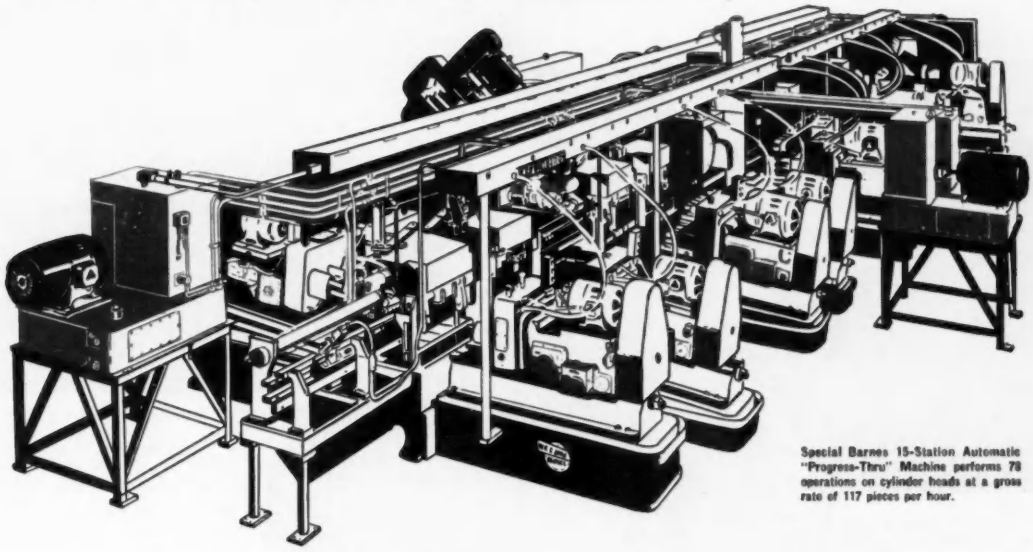
CLEVELAND, OHIO

STAMPING DIVISION: Detroit Office, 13001 James Couzens Highway, Detroit 35, Michigan

ORIGINATORS OF THE BAYONET-TYPE CAP AND FILLER-NECK FOR PRESSURIZED COOLING SYSTEMS

SPECIAL HYDRAULIC EQUIPMENT...



Special Barnes 15-Station Automatic "Progress-Thru" Machine performs 78 operations on cylinder heads at a gross rate of 117 pieces per hour.

...another integral part of a coordinated

6-POINT MACHINE TOOL BUILDING SERVICE

by W. F. & John Barnes

BARNES MACHINE TOOL BUILDING SERVICE INCLUDES . . . .

1. SPECIALIZED MANUFACTURING FACILITIES — 75 year background, large well equipped plant efficiently tooled to produce high production machines.
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3. SPECIAL GAUGES, FIXTURES, TOOLS — designed for each individual machining problem, assure accuracy of operations at high production speeds.
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5. SPECIAL HANDLING AND CONVEYOR EQUIPMENT — designed and built to reduce work handling, effect maximum safety and efficiency.
6. COORDINATED DESIGN AND ENGINEERING — Mechanical, Hydraulic, Electrical, Process, Tool, and Fixture Engineers work together at Barnes. Team-work solves complex problems quickly.

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The John S. Barnes hydraulic systems employed on Barnes Units for machine and fixture actuation have long been noted for their outstanding efficiency and long trouble-free service. As a result, the accumulated experience of this division is a vital part of the Barnes 6-point machine tool building service. The example above illustrates a typical application on a high production cylinder head machine. The individual heads have self-contained units; other units for clamping, positioning and transfer of workpieces are installed as illustrated. All are built to JIC standards for easy accessibility. While some components are standardized, often special valves and mountings are desirable and are built to best suit the job needs. Thus, there are no limitations, which permits achieving peak machining efficiency.

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Because all planning, engineering, and manufacturing efforts at Barnes are closely coordinated, you get a complete machine tool building service all from one convenient, dependable source. Broad, varied engineering experience and creative skills have been developed over the years which enable Barnes to help you solve many troublesome production problems. If your present or future machining needs call for faster, more efficient methods, we will be glad to work with you as rapidly as current conditions will permit.

W. F. & JOHN BARNES

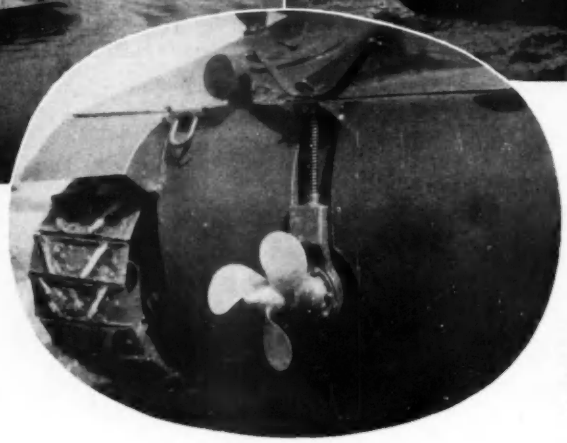
Write for Full Details Ask for free booklet "Coordinated Machine Engineering," describing the details of Barnes machine tool building service. Illustrates modern machines and mass production techniques.

W. F. & JOHN BARNES COMPANY
312 S. WATER ST., ROCKFORD, ILLINOIS

MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES

The 6300-lb vehicle is propeller driven when in water of sufficient depth to assure floating.

Front quarter view of the amphibious vehicle.



Propeller arrangement on vehicle for civilian use. The tail shaft and propeller can be removed and reinstalled without the use of tools.

PARIS, FRANCE

New French Vehicle for Land or Water

By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

A TRACKLAYING type amphibious vehicle has been produced in the Gabriel Voisin shops at Paris on the order of the French Ministry of Armaments. It was designed by Edmond Moglia who, until the collapse of France, was responsible for the design and production of Hotchkiss tanks. Engineer Moglia is a recognized French authority on this type of vehicle.

The land-and-water vehicle is not armoured, but is designed to have a greater range of mobility than any land vehicle, and has been produced particularly to meet the conditions prevailing in Indo-China, where paddy fields and rivers make other types inoperative. It is designed to carry six men and their equipment and can get them across country which is negotiable only with great difficulty afoot. Obviously it could be armor plated and fitted with machine guns without any change in the basic design.

An outstanding feature of this new vehicle is the adoption of the all-rubber track as developed under Kegresse patents. Flanged metal plates, with projecting rubber strips, are bolted to the outer face of the track, the four bolts per plate also passing through the stud plates on the inner face of the band. Each plate is separate from the others, and no links are employed. Each of the five rubber faced inner rollers on each side is mounted on a trailing arm with coil spring suspension. Each roller can carry a hollow disk, or a metal disk filled with cork, held on by a single central screw. While not necessary for operation on land, these raise the water line when the vehicle is used on water and reduce the unit pressure when on water-covered mud.

The engine is a four cylinder, valve-in-head Talbot of 158 cu in., developing 85 hp, mounted vertically at the rear, with a flat radiator through which air is driven by means of a turbine. The engine drives forward by means of an enclosed central shaft to a four-speed Wilson pre-selective gearbox. As there is an optional step-down, the range is eight speeds ahead and two in reverse. The drive gear housing is fully

(*Turn to page* 100, *please*)

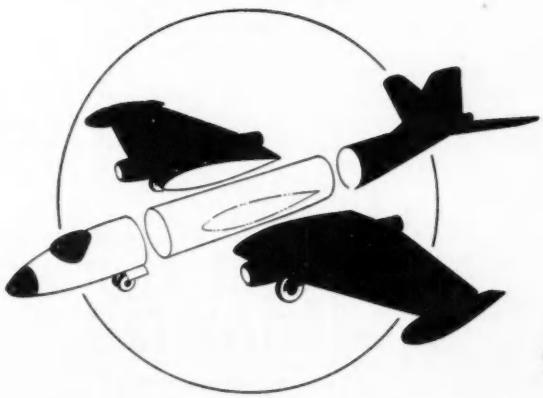
Subcontractors Have Big Part in Martin Aircraft Production

Components for the Marlin flying boat that are being subcontracted for are shown in black. About 25 per cent, by weight, will be built by subcontractors.

IN keeping with the industry's current policy of subcontracting a considerable portion of prime aircraft contracts, the Glenn L. Martin Co. has agreements with some 358 subcontractors for the production of components for the Marlin anti-submarine flying boat, the B-57A Canberra—night intruder version—and the Martin 4-O-4 airliner. Most of the subcontractors operate small businesses as evidenced by the fact that only 28 firms are considered major subcontractors. About two-thirds of the purchased-parts business goes to small manufacturers. Also engaged in the supply of various Martin aircraft components are 4226 vendors and suppliers.

Subcontractors and vendors build about 25 per cent, by weight, of the Marlin flying boat, and about 60 per cent, by weight, of the Canberra night intruder. Components being purchased for the Marlin include ailerons, bomb bay doors, outer wings, wing tips, elevators, stabilizers, fins, rudders, radomes, tail canopies, windshields, fuel cells, breaching gear flotation tanks, floats and struts, inner and outer flaps.

For the twin-jet Canberra, Martin relies on its subcontractors and venders to supply nine major parts. These include the nose cap, pilot's enclosure, ejection seats, wings, aft fuselage, empennage, main and nose gear, fuel cells, and wing tanks. One of the major subcontractors working on parts for the Canberra is the Hudson Motor Car Co. Without affecting normal production of passenger cars, Hudson is starting to turn out rear fuselage and tail sections for the twin-jet night intruder bomber. Another large contract has been let to the Bellanca Aircraft Corp. for fins, rudders, and rudder tabs to be used on the Martin P5M-1 Marlin.



Black portions of the sectionalized Canberra show the various components that are being built by outside companies.

The Potential *Automotive Market*

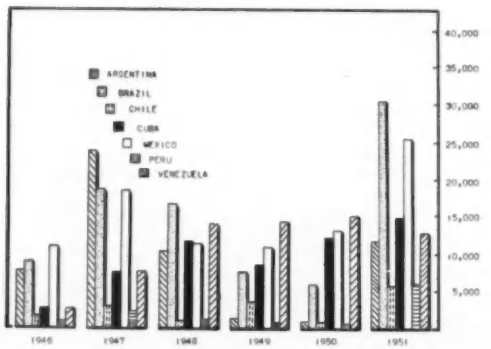
THE Latin American republics as a unit represent our largest and fastest growing export market for motor vehicles and spare parts. While the real potential of this area has hardly been touched, future U. S. sales will be governed largely by three basic factors:

1. Monetary exchange, which depends on our willingness to purchase Latin American raw materials.
2. Production facilities, which will determine our ability to deliver desired types and quantities of vehicles and parts.
3. Competition from both European and Canadian suppliers.

The current American rearmament program plus strategic materials stockpiling in recent years have given the mineral producing countries of South America badly needed injections of U. S. dollars. Heaviest buying of raw materials came at a time, fortunately, when most of these countries had seriously depleted the large dollar credits built up during World War II. The unprecedented demand for coffee and sugar during the past 20 months together with increased oil shipments after the Iranian crisis, also have strengthened Latin American purchasing power. As a result, U. S. sales of automotive equipment, which had slumped badly in nearly every country during 1949 and 1950, increased sharply during the first half of last year and the peak has not yet appeared. Our total sales of vehicles, parts and accessories from January to June of 1951, for example, were $293 million, as compared to $132 million for the same period of 1950. Coffee-rich Brazil and mineral-rich Mexico are the brightest spots in this picture with purchases running nearly 300 per cent over the previous year. Not shown in these figures are the large scale shipments of industrial machinery, agricultural implements, communication equipment, building materials and other capital goods which have greatly strengthened the economic structure of these countries.

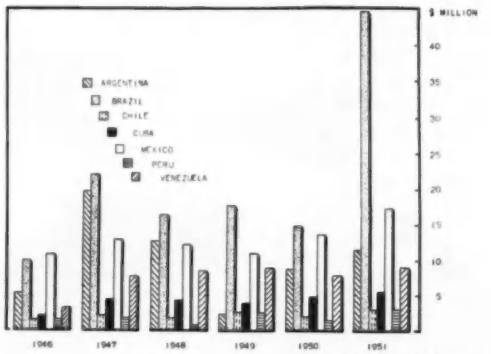
Latin Americans also are benefiting, indirectly, from the dollars being pumped into E.R.P., since Europe has always been a major consumer of South American foodstuffs, minerals and fibers. Argentina, of course, can no longer demand the high prices for her agricultural surplus that were customary during and immediately following the war. But, generally, improvements in Latin America's trade with Europe have largely paralleled European industrial recovery. In recent months, due to critical financial conditions in France and England, there has been a noticeable trend toward the government-arranged barter deals that so

Principal Latin American Buyers of U. S. Passenger Cars and Chassis



Source: U. S. Dept. of Commerce.

Principal Latin American Buyers of U. S. Automotive Replacement Parts



Source: U. S. Dept. of Commerce.

in Latin America

General Motors Assembly Plant in Sao Paulo, Brazil. Photo courtesy G.M. Overseas Operations.

disturbed normal trade patterns before the war. Typical of these was the recent deal involving Bolivian minerals and French and Spanish tires. The extent of such trading will greatly depend, of course, on Europe's financial position in coming years.

Our ability to deliver desired quantities of automotive equipment naturally hinges on the availability of materials in this country and on the amount of non-military production permitted under our long range defense program. Until now, the softening market in the United States has permitted large scale increases in export shipments of both parts and assembled vehicles. The supply of such specialized replacement items as springs, spark plugs and gears, however, has, in some cases, been insufficient for both the export and domestic market.

European Sales Increasing

Foreign competition has been a growing factor in the Latin American automotive market since 1948. European car, truck and bus sales have had their largest increases in Argentina, Uruguay, Brazil and Chile, while Canadian vehicles have made their greatest percentage gains in Colombia and Peru.

By George M. Galster

Other countries such as Cuba purchased nearly four times as many European vehicles in 1951 as in 1950, but these increases still account for only two-three per cent of the total U. S. sales. The United States continues to dominate the market in Mexico, Venezuela, Central America and the West Indian republics in all categories except motorcycles.

English passenger cars such as the Austin, Ford and Hillman have accounted for a large portion of European sales in Latin America. In Brazil, for example, the percentage of new cars purchased from the U. S. steadily declined after the war as follows:

1946	88%
1947	78%
1948	60%
1949	44%
1950	36%

Increased Brazilian buying last year, however, gave us an estimated 60 per cent of the market, based on statistics covering the first ten months of 1951. American trucks, meanwhile, are accounting for about 80 per cent of the total purchased by Brazil, as compared to 94 per cent of those imported during 1946-1949.

West German exports, particu-

Motor Vehicle Registrations in Latin American Countries

Country	Passenger Cars and Taxis	Trucks	Buses	Motor-cycles	Population per Vehicle
Bolivia	3600	8200	480	400	337
Chile	38000	30000	4700	1700	80
Colombia	40500	34100	8800	1500	188
Costa Rica	5000	2800	900	150	108
Cuba	84000	37000	5700	15500	47
Dominican Republic	5400	3580	580	740	246
Ecuador	4500	8200	2300	200	262
El Salvador	9000	1650	1300	200	231
Guatemala	9500	4700	620	2000	291
Haiti	3600	1400	360	200	770
Honduras	3100	1650	70	200	393
Nicaragua	2200	1520	270	265	335
Panama	25000	2500	1300	560	29
Paraguay	2400	1500	500	250	342
Peru	35000	20000	2800	1400	181
Uruguay	46000	30000	1600	1800	37

Note: The potential Latin-American automotive market can be judged by the above estimated registrations in addition to those given in the text of this article.

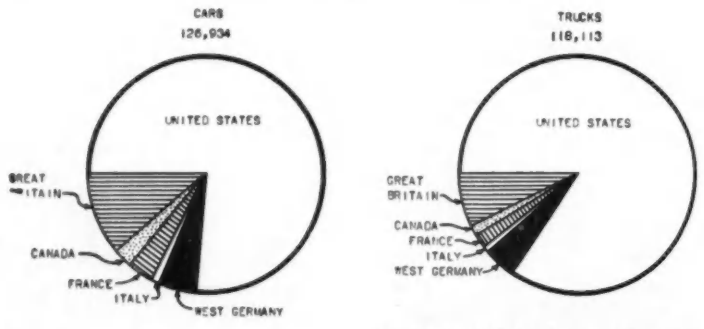
larly into Argentina and Brazil, have shown the most surprising gains during the past two years. In many countries, in fact, German sales of passenger cars and commercial vehicles exceeded French and Italian sales during 1951, and are second only to British and American totals. These gains reflect the widespread acceptance of German workmanship that was established in Latin America before the war, as well as the intense sales effort that has been made by German firms in the past few years. Both Argentina and Brazil were visited recently by Borgward (Bremen) factory representatives, and it has been reported that efforts are under way to establish full scale truck assembly plants in these countries. In fact, the light two-cylinder passenger car unveiled by the Argentine government early this year evidently is being assembled from German-made components.

French exporters have found Brazil and Uruguay to be their most lucrative markets in Latin America, while Italian firms are concentrating their efforts in Argentina and Brazil. Isotta-Fraschini trucks are being assembled in Brazil at the present time and the Argentine government has expressed much interest in this venture. Another assembly plant set up in Mexico City by the Austin Motor Co. Ltd. is nearly ready to begin producing the A40 Devon sedan. At the present writing, limited numbers of Hillmans also are being assembled by the Packard plant in Puebla, Mexico.

European motorcycles and other light vehicles classified as motorcycles continue to dominate the Latin American market. British makes are most popular in this category, with German products making rapid gains. A few Czechoslovakian sales of motorcycles also were reported in 1951. No Russian automotive equipment has been sold in Latin America since before the war, but Japanese firms are expected to offer certain parts and accessories during 1952.

This overall influx of European automotive products has been aided by the continuing dollar shortages in Latin America, as well as the devaluations of European currency. A factor often underestimated, however, is the growing popularity of low powered European cars which are said to be less handicappsed, performance-wise, by the low octane fuel available in the Latin American countries. One outstanding exception is the Willys Jeep which is ideally suited to provide utility transportation in almost impassable areas. According to Mr. Marcel DeMuller, president of Willys Export Division, over 55,000 Jeeps were exported to Latin America from 1945 to January, 1952, and the demand is still growing. So important have these units become, incidentally, that many countries report

Latin American Purchases of Passenger Cars and Commercial Vehicles During First 10 Months of 1951



Source: Society of Motor Manufacturers and Traders, Ltd.

"Jeep" imports in a distinct classification, separate from car, truck or bus purchases.

Considering the availability of replacement parts, U. S. suppliers of cars and trucks are in an advantageous position because of assembly plant and/or warehousing operations in Argentina, Brazil, Peru, Uruguay, Venezuela and Mexico, plus well established distributor setups in other countries. Proximity of important sales areas like Cuba and Mexico make it especially easy to fill emergency orders for axles, transmissions and other parts not normally stocked by local distributors. European manufacturers are making efforts to offset this advantage by building up replacement parts inventories in major cities and by speeding up mail order service. Incidentally, an adequate tool kit and operator's manual furnished with each unit has also gained favor among purchasers of European vehicles.

The Mexican Market

Mexico is believed to have about 194,000 cars and 145,800 trucks and buses in operation at the present time. Estimates of the total vary because of illegal entries across the border and incomplete registration records in certain areas.

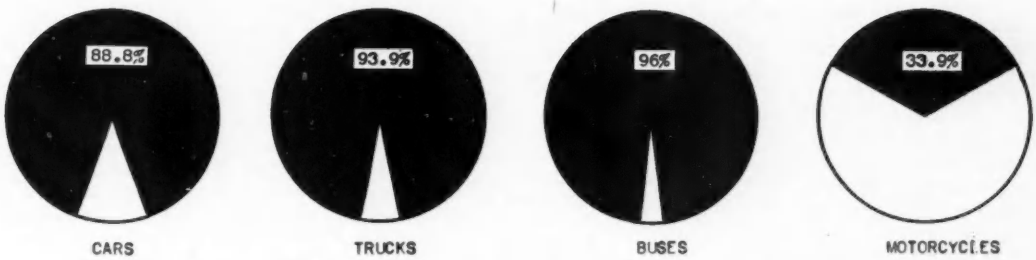
The ratio of private car ownership to population is about 1/147 compared to 1/5 in the United States. As a result, 55-60 per cent of all passenger traffic in the country is carried by bus. Virtually any part of Mexico can be reached by first or second class bus service, and schedules of a sort are maintained the year round over some nearly impassable roads. Inadequate railroad facilities also have created a remarkable growth in the trucking industry, with commercial vehicle registrations increasing 77 per cent in the first six years following World War II. Some authorities even estimate that tonnage carried by truck now exceeds the total handled by the railroads.

Late last year, the Ministry of Communication and Public Works certified as public necessity an immediate 25 per cent increase in the number of trucks and buses in use. Since two-thirds of the units now in service are 10-15 years old, it is estimated that Mexico will need at least 100,000 new commercial vehicles before 1954.

Maintenance, especially among fleet operators, is generally poor by U. S. standards because of severe shortages of trained mechanics and modern service equipment. However, tune-up instruments, wheel balancing and alignment equipment and similar items entered Mexico in greatly increasing numbers during 1951. Both gasoline and Diesel fuels seem to be plentiful, but local shortages still develop because of transportation bottlenecks. Because of refinery operations, propane is growing in popularity as an engine fuel. At least one U. S. truck manufacturer will soon begin assemblying a propane-powered unit, and builders of LPG conversion equipment can expect a growing market in Mexico.

Automobile assembly plants have expanded rapidly in Mexico, beginning with the first Ford factory in 1925. Present investment in the industry is estimated at $32 million, with operations being conducted by the following groups:

General Motors—all divisions
Ford—all divisions, limited tractor production
Chrysler—all divisions
International Harvester—trucks only
Reo
Diamond T
Hudson—also assembles Willys, assembled a few French Renaults during 1950
Nash—also assembles both Willys and Studebakers
Packard—also assembles the British Hillman cars
Willys—new plant now under construction
Austin—new production starting 1952

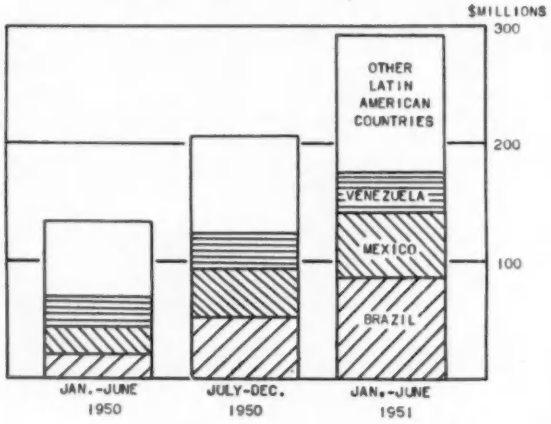


Motor Vehicles of U. S. Manufacture Registered in Latin America

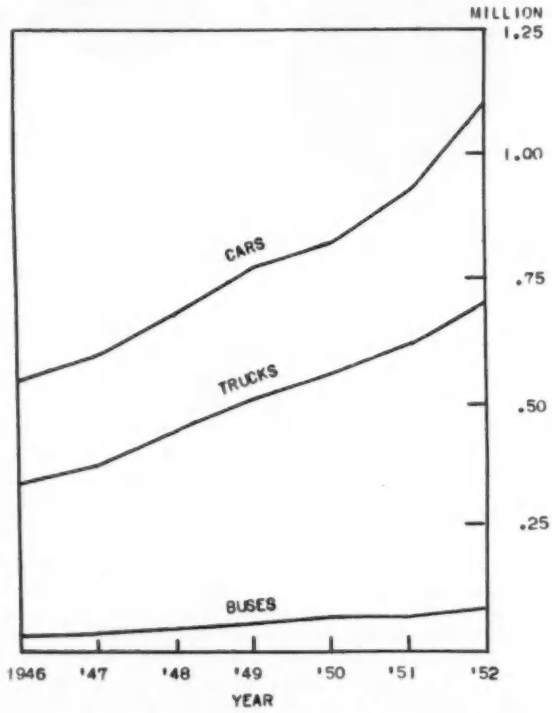
Ford and G.M. operations are owned entirely by the parent firms and their investments are estimated at $11.5 million and $13 million respectively. All other plants are controlled by Mexican capital. It is also reported that efforts are being made to establish a $10 million Fiat factory in Mexico City which will both fabricate and assemble cars and trucks.

Total potential of the Mexican automobile industry is estimated at 55,000 units per year, with the new Willys Overland operation expected to add another 3000 units yearly. The General Motors plant is currently operating at peak capacity, devoting 45 per cent of its output to truck production. Operations at other plants, however, are averaging only 75 per cent

Total Value of U. S. Exports of Vehicles, Parts, and Accessories (millions of dollars)



Number of Vehicles Registered in the Latin American Countries



capacity at the present time. Local firms furnish most components such as batteries, upholstery, light bulbs (except sealed-beam units), tires, springs and most molded rubber parts. Limited production of ignition cable and wiring by Consolidada Industries is also expected during 1952.

Practically all of the trucks and buses assembled in Mexico are in the light of medium weight category. A few very heavy units were purchased in 1951, but operation of these types is difficult because of terrain.

Brazilian Market Expanding

New records were established in Brazil last year, both in the number of vehicles registered and in their utilization. Most recent estimates indicate 288,000 passenger cars and taxis in service plus 237,000 trucks, 15,800 buses and 20,500 motorcycles. The demand for nearly all types of vehicles still is strong and speculative purchases for resale are helping to keep prices high. New highway construction has been vigorously pushed, particularly inland from Bahia and Recife, and this development has accounted for part of the sharp increase in rural motor travel.

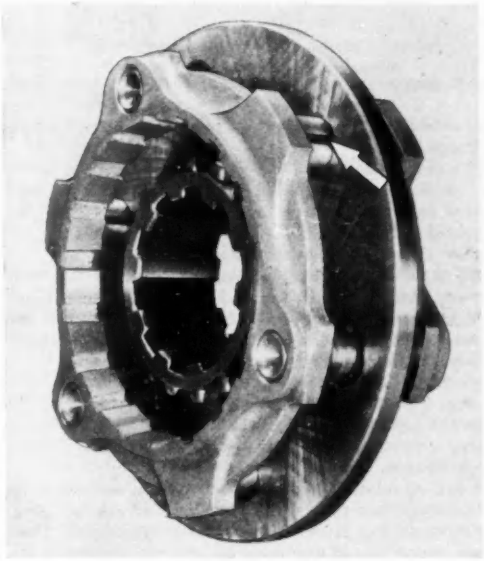
Manufacturing of replacement parts and accessories is expanding rapidly in Brazil. From an estimated three per cent in 1940, local sources now are supplying 26 per cent of the country's needs. Except for special sizes, all tires and tubes are made locally. However, Brazil will have to import raw rubber if this industry expands further.

Probably the most significant recent development in the Brazilian automotive market is the manufacturing of Isotta-Fraschini Diesel trucks, mentioned earlier in this article. The National Motor Factory near Rio was completely retooled for this project during 1950, and an eventual production of ten units daily is aimed at. This factory was built and equipped during the war with American aid, and was originally intended for the manufacture of aircraft engines. The plant is the largest and best equipped in South America, and Italian engineers have been working very effectively with Brazilian technicians on this job. Body stampings, engine components and steering apparatus are being made at the factory, and Sao Paulo firms are furnishing radiators, tires, springs and batteries. Transmissions, differentials and axles are being imported from Italy until forging presses can be installed. The truck itself is a medium weight unit, offered in several body styles and designed for long hauls on primitive roads.

The local press reported in October of last year that the government hopes to establish three additional factories to produce cars and

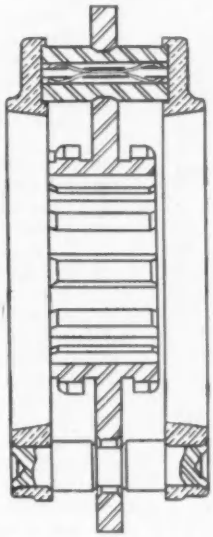
(*Turn to page* 76, *please*)

Simplified Synchronizer for Clark Transmissions



Clark Split Pin synchronizer assembly.

This sectional view shows arrangement of parts in the new synchronizer.



To meet the increased demand for synchronized transmissions for heavy duty motor vehicles, the Clark Equipment Co. recently developed what is termed a "Split Pin" synchronizer for use in its line of heavy duty transmissions. Designed to replace the former type of synchronizer made by the company as well as for new applications, the new unit is said to combine simplicity, dependability, and longer life.

As illustrated, the noteworthy feature of the synchronizer is found in the arrangement of the energizer spring and its assembly with the split pin. The pin is made in two halves with a square hole into which the two formed springs are assembled back to back. This construction eliminates conventional design complications and eliminates sliding friction on the spring.

That the split pin construction also has served to clean up and simplify the design of the entire unit is evident from the illustration. Component parts are of simpler design, there are less parts to an assembly, and the entire unit is more compact and takes less space within the transmission.

The assembly consists essentially of the two outer bronze alloy clutching members, the hardened steel center plate with splined bore, and hardened pins. Three cam-pins hold the assembly together securely. The three split pins are assembled into blind end bores in the outer members.

According to Clark engineers the general simplicity of the synchronizer promises unusual ruggedness as well as the ability to operate for extremely high mileages without maintenance.

• • •

France Set to Launch Broad Road Program

France is expected to spend a sizable sum of money during the next five years on a national road improvement scheme. Funds for this will come largely from gasoline taxes and are entirely independent of ordinary highway maintenance.

The improvements comprise the modernizing of 11 through routes and the removal of all grade crossings on these roads. Some new roads will be built, but these are mostly to relieve congestion in the vicinities of big cities.

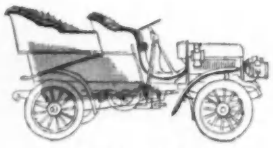
Part of the funds will be used for building bridges and repairing damage in war-wrecked districts, and there will be five flower-bedecked routes to attract tourists. In conjunction with Italy and Switzerland, some of the road improvement funds will be used for boring a road tunnel under Mount Blanc.

Conestoga Wagon

1852

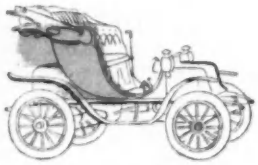
Studebaker Saga

100 YEARS OF BUILDING VEHICLES IN PEACE AND WAR



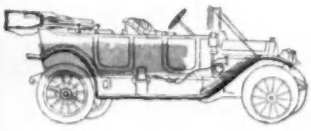
Studebaker-Garford

1904



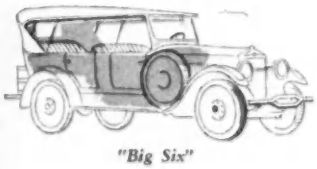
Electric

1906



The E-M-F

1912



"Big Six"

1922

1852 Henry and Clem Studebaker open a blacksmith and wagon shop at South Bend, Ind.

1857 U. S. Government orders 100 wagons for the Army. Studebaker Brothers build their first buggy.

1858 J. M. Studebaker, who has saved $8000 during five years' work as blacksmith and wagon builder in California gold fields, returns to South Bend and buys his brother Henry's interest in the business.

1860 First branch is opened at LaPorte, Ind.

1863 Peter Studebaker joins his brothers as sales manager.

1865 Peter opens branch at St. Joseph, Mo., "jumping off" place for the West.

1868 Studebaker Brothers Manufacturing Co. is incorporated, with Clem, J. M., and Peter each putting up $25,000 for the company's $75,000 capitalization. Assets: $223,296.06. Employes, 190; year's production, 3955 vehicles. Jacob F. Studebaker joins the company.

1873 Annual production tops 10,000 vehicles.

1874 Sales top $1,000,000. Fire destroys two-thirds of the new factory.

1876 Studebaker wagon takes prizes at U. S. Centennial Exposition.

1877 Silver Anniversary: Employes, 700; production, 18,500 vehicles.

1879 Annual sales top $2,000,000. 1880 Telephone installed.

1883 58 electric lamps are installed. Buildings, sheds, yards, etc., cover 80 acres. Correspondence reaches peak of 500 letters a day. Advertising, stationery and postage budget: $2500. 1887 Jacob F. Studebaker dies.

1889 President Harrison orders Studebaker carriage for the White House.

1895 Studebaker correspondence discusses horseless vehicles. Henry Studebaker dies. 1897 Death of Peter Studebaker.

1899 Studebaker to make bodies for horseless vehicles.

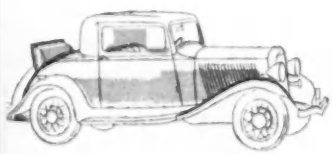
1902 Golden Anniversary: Employes, 2500; annual production, 100,000 vehicles; annual sales, $4,000,000. First horseless vehicle, an electric, sold to F. W. Blees of Macon, Mo. Twenty electrics produced during the year. Second electric built to order for Thomas A. Edison.

1904 First gasoline powered vehicle sold to H. D. Johnson of South Bend, Ind.

1908 Studebaker enters sales agreement with Everitt-Metzger-Flanders Auto Co., Detroit, Mich.

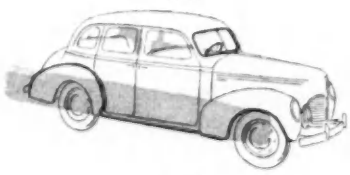
1910 Harold S. Vance takes 15¢ an hr job with Everitt-Metzger-Flanders.

1932



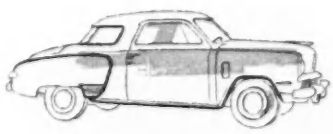
Rockne Six

1939



Champion

1947



Champion Starlight

The Studebaker Enterprise

Statistical Summary by Corporate Entities

Period	Principal Products	Sales Value	Net Income	Dividends	Net Worth (End of Period)
H. & C. Studebaker (1852-67)	20,000 wagons & buggies	$2,000,000	$223,201	.....	$223,269
Studebaker Brothers Manufacturing Company (1868-1910)	2,200,000 wagons & buggies 27,818 autos	$119,249,403	$16,674,682	$6,758,088	$11,714,863
Studebaker Corporation & Successors (1911-51)	800,000 wagons & buggies 4,064,948 autos & trucks	$91,257,111 $5,966,441,222	$278,786,254	$142,326,188	$105,000,000
Century Totals (1852-1951)	7,092,766 vehicles	$6,178,947,736	$295,684,138	$149,084,280	$105,000,000

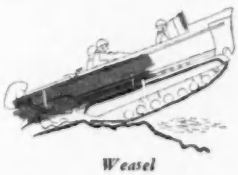
1911 The Studebaker Corp. formed to acquire the Studebaker Brothers Manufacturing Co. and the Everitt-Metzger-Flanders Co., F. S. Fish, president, J M. Studebaker, chairman of the board. 8000 employes, 1500 dealers, 22,555 autos made and sold. A. R. Erskine becomes Studebaker treasurer. Paul G. Hoffman goes to work for a Studebaker dealer in California. 1913 Studebaker cars equipped with electric starters.
1917 Death of J. M. Studebaker, last of the founding brothers. Half of Studebaker plant capacity devoted to war production.
1919 Studebaker Big Six and Special Six become immediate successes when introduced. Studebaker discontinues carriage and buggy manufacture.
1920 Studebaker discontinues wagon manufacture.
1922 Annual sales cross the $100 million mark.
1935 The present Studebaker Corp. is organized with Harold S. Vance as chairman of the board and Paul G. Hoffman, president, after a 20 month receivership. 1939 Studebaker invades low price field, with Champion.
1942 Studebaker producing military trucks and bomber engines.
1943 Production of Studebaker-developed Weasel for Armed Forces started.
1946 Studebaker introduces first completely new postwar automobile.
1947 Company acquires modern truck plant in South Bend and greatly expands commercial truck production and sales.
1948 Paul G. Hoffman resignation as president to become head of Economic Cooperation Administration; Harold S. Vance assumes presidency.
1951 100th Year: 23,000 employes; production, 285,000 units; annual sales cross half billion dollar mark for first time.
1952 Production of turbojet engines for B-47 bomber engines.

Defense and War

1952

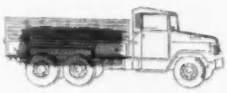
Turbo-jet Engine

1943



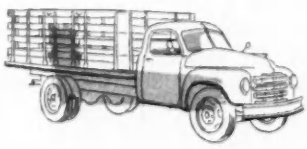
Weasel

1942



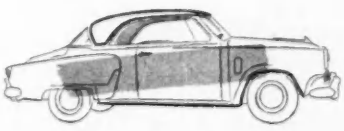
Truck

1950



Truck

1952



Commander Starliner

Peace

Production of Some Parts Already Under Way and Experimental Work Is Being Conducted by Numerous Companies. Automatic Shell-Making Machines Demonstrated Publicly for First Time at Foundry Exposition

By James R. Custer

Shell Mold Casting Invades Automotive

DESPITE an unclarified patent situation and the lack of production equipment, the shell mold method of casting parts has made rapid gains during the past two years with scores of foundries now engaged in testing it, or already are using it in production. Two years ago it was in the laboratory experimental stage, the widespread interest in this revolutionary casting process, also called the Croning Process (see AUTOMOTIVE INDUSTRIES, April 15, 1950, page 68) was disclosed by a survey of the International Foundry Congress and Show early last month at Atlantic City, N. J.

Already this casting method is receiving considerable attention in the automotive and aviation fields, as great possibilities are foreseen for it in making parts economically in large volume. For some time now Ford has been using it in production. Another user is the Lynchburg Foundry, which has been casting live rollers and clutch plates by this method for Caterpillar tractors. Independent foundries are aiming to acquire additional automotive parts business with it.

Several motor vehicle manufacturers and parts makers are engaged in shell molding research work. In addition to those parts in production, a large variety is reported being made experimentally. In both categories they include camshafts, crankshafts, valves, rocker arms, flywheels, jet engine parts, automatic transmission parts, aircraft castings, and some Ordnance items.

Among the advantages claimed for shell mold castings are lower cost, smooth finishes, tolerances as small as 0.002 to 0.003 in., and the precision casting of very thin sections. They can be made either of ferrous or non-ferrous alloys, including magnesium and high chrome alloys.

It will be recalled that this casting process was demonstrated publicly in 1950 for the first time in this country by the Bakelite Division of Union Carbide and Carbon Corp. This technique, which was new to most American foundrymen then, was brought to the United States in 1947 from Germany where it was developed during the war. Johannes Croning is credited as the inventor, but his patent claims have not been recognized here to date and of late companies have been going ahead rapidly with their development work.

At the foundry show last month Bakelite, The Borden Co., Durez Plastics and Chemicals, Inc., General Electric Co., and Monsanto Chemical Co. displayed various accomplishments in the making of shell molds, including their recently developed resins for that purpose. Dow Corning Corp. exhibited its Silicone release agents. A symposium on shell molding was attended by a capacity crowd of engineers.

C. W. Blount, Bakelite vice president, stated that shell molding resins are now being shipped by the industry at the rate of approximately two million lb a year. Two years ago, he said, the shipment for the year was 24,000 lb, mostly for experimental use. E. S. Bauer, industrial products manager of Monsanto's Plastic Division, forecast an industry-wide annual production of 20 to 25 million lb in five years. The extensive use of the shell mold method at this time is further emphasized by the fact that the shells are only ⅛ to 3/16 in. thick and composed of five to eight per cent resin with the remainder sand.

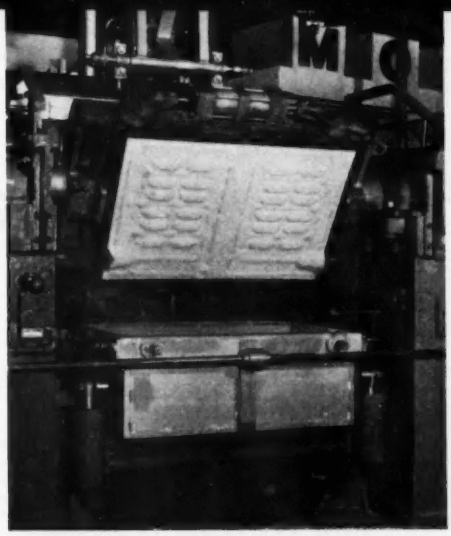
The first public demonstrations of two automatic

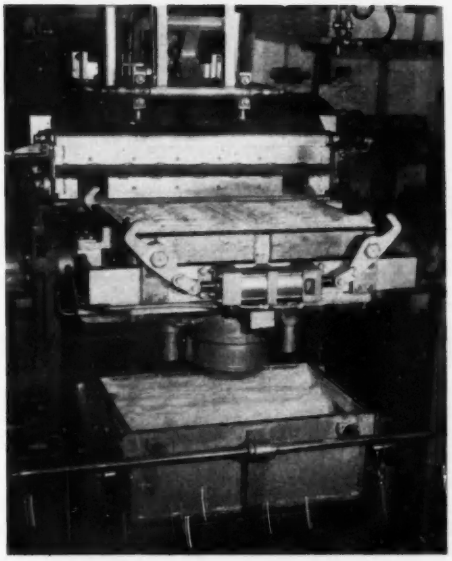
These views show three operations of the Sutter automatic shell making machine, which is similar to those being used in a large automotive foundry.

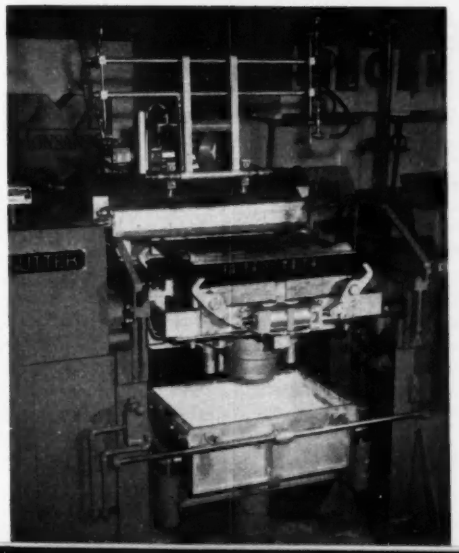
(Top) Hot pattern with coating of resin and sand is being raised from the resin-sand box to horizontal position.

(Center) Oven is moving forward to position over resin-sand coating to cure it.

(Bottom) With oven returned to original position, the hard shell has been raised above the pattern by ejection pins.







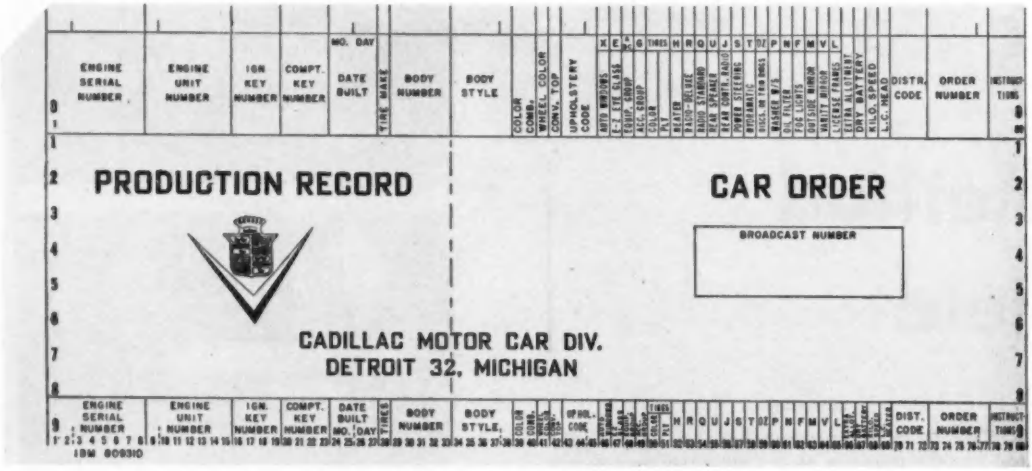
Method Field

machines for making shell molds took place at the show. At the Monsanto booth shell molds were turned out on the automatic machine developed by the Sutter Products Corp. of Detroit. Sutter machines of similar design (see accompanying illustrations) are reported to be in use at the foundry of a large car manufacturer. A complete cycle for making a shell requires 70 to 90 sec, the time being determined by the kind of resin and the amount of curing necessary to produce a satisfactory shell.

The cycle on the Sutter machine begins with heating the metal pattern in the oven to 450 F and spraying it with a release agent, after which the pattern is inverted and the resin-sand box raised to it. The pattern is clamped to the box and both rolled back so that the resin-sand mixture falls on the hot pattern for 10 to 12 sec and a thin layer sticks to it. After unclamping, the pattern and shell move upward and the box is lowered. With the pattern and shell in a horizontal position, the oven moves forward to a position over the shell, which is cured for about 30 sec at 900 F. Then the oven moves back and stripper pins actuated hydraulically raise the shell six in. above the pattern, which is removed by a wood fork. Three of the operations with the Sutter machine are illustrated.

The Shell-O-Matic Corp., division of the Newark Pattern Works, Newark, N. J., operated its shell making machine at the Borden exhibit. It is a self-contained unit consisting of radiant heated curing oven, rollover pattern mechanism, dump box, and automatic ejection of shells. The Shell Mold Division of the Winter Engineering Corp., Chicago, displayed the design of its automatic machine for making shell molds. It is produced by the Prescott Co. of Menominee, Mich.

Different CARS *by the*



Sample IBM card used in scheduling Cadillac car assembly

WITH the variety of options offered in 1952 cars, some producers can build millions of different automobiles — differing in body models, color, trim and upholstery, equipment groups and accessories. It is commonplace this year to be able to produce different cars by the hundreds of thousands on many makes.

Incredible as it may sound, some manufacturers could run out an entire year's production without having two cars exactly alike.

This sounds like a paradox when it is considered that motor vehicle production is on the highest level of manufacturing techniques, designed for maximum volume and interchangeability of parts. It does prove, however, that automobiles are actually tailor-made to suit the specifications and whims of individual buyers.

This process has been going on for many years. It is not new to people responsible for scheduling paint and assembly lines. Actually, instead of cars being as alike as peas in a pod, which one might expect to find in this highly mechanized industry, each one may differ from another in color combinations, trim options, wheel or wheel trim, etc. Even major mechanical elements — engines, transmissions, axles, and brakes are subject to variations due to options. For example, most makes today offer either manual shift or automatic drive, some offer overdrive as well. And on some makes, there will be three or more rear axle ratio options.

Analysis shows that although color options—standard options, two-tones, and extra cost options — and contrasting or harmonizing trim — are available in profusion, they represent relatively simple arithmetic combinations. For example, one Buick Roadmaster model has 190 combinations of color and trim; Packard has several Series 200 models with 147 combinations; while Cadillac goes up to 108 on the Series 75; and the Ford Crestline convertible offers 176.

What boosts the totals to astronomical heights, however, are the accessory options. On Cadillac, for example, most models have a choice of six accessory groups, and a choice out of three equipment groups. While these include major equipment items, there is another choice out of perhaps ten or more special accessories which may be ordered by a Cadillac owner in groups of five or six—more or less.

On Buicks accessory items vary in number due to the fact that the Roadmaster, for example, carries most major items as standard equipment. On Series 40 and 50, however, there is a choice of 10 or 11 accessory items which may be ordered in groups of five or more, on the average.

De Soto has an option of some 14 accessories, counting only major items. Packard's variety ranges from 26 on two models, 20 on two models, to ten on the 400, the latter being equipped with certain items as standard.

Although Chevrolet is unique in that most accesso-

MILLIONS....

By Joseph Geschelin

ries—heaters, radio, and other options—are installed by the dealers, there are 10 to 12 special items that can be installed at the factory.

Suffice it is to say that the sum total of combinations possible within some makes run into the millions. On some others it runs into the hundreds of thousands. Tens of thousands of combinations, found in some makes, are commonplace. We calculated around 6-million for Cadillac, using conservative values. Our calculations on De Soto indicate that the 1952 line is quite capable of hitting almost 3-million combinations.

Because of the task of accumulating good data and the job of making the calculations, we have made a sampling of only a few makes which are mentioned specifically.

What makes the options grow so fantastically is the algebra of combinations. Where there are definite combinations such as color and trim options, which go together in a specified manner, they simply multiply. If there is a choice of three makes of tires, the total number is multiplied by three. In the case of convertibles, after the number of combinations of color and trim is found, it is multipled by the number of top materials.

But suppose there are 13 accessory options, and we assume that on the average a buyer will select some five out of the 13. How many different combinations are there in 13 taken five at a time? Combinations are:

$$ {}_nC_r = \frac{n!}{r!(n-r)!} $$

where: C — number of combinations
n — number of factors
r — size of the group

and where the designation (!) means factorial n or r

Here is a typical numerical example taken from one of the car calculations, where the number of items is 13 and group size selected arbitrarily as five:

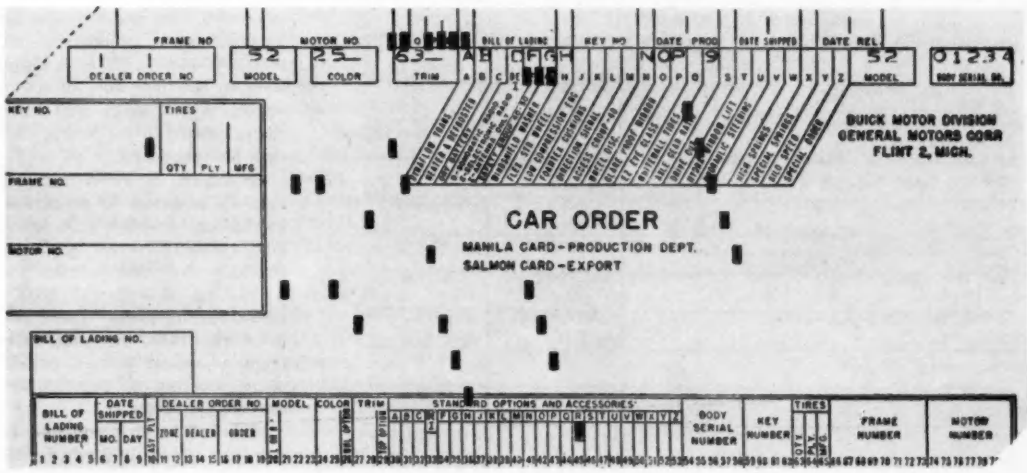
$$ nCr = \frac{13x12x11x10x9x8x7x6x5x4x3x2x1}{(5x4x3x2x1)\ \ (8x7x6x5x4x3x2x1)} = 1287 $$

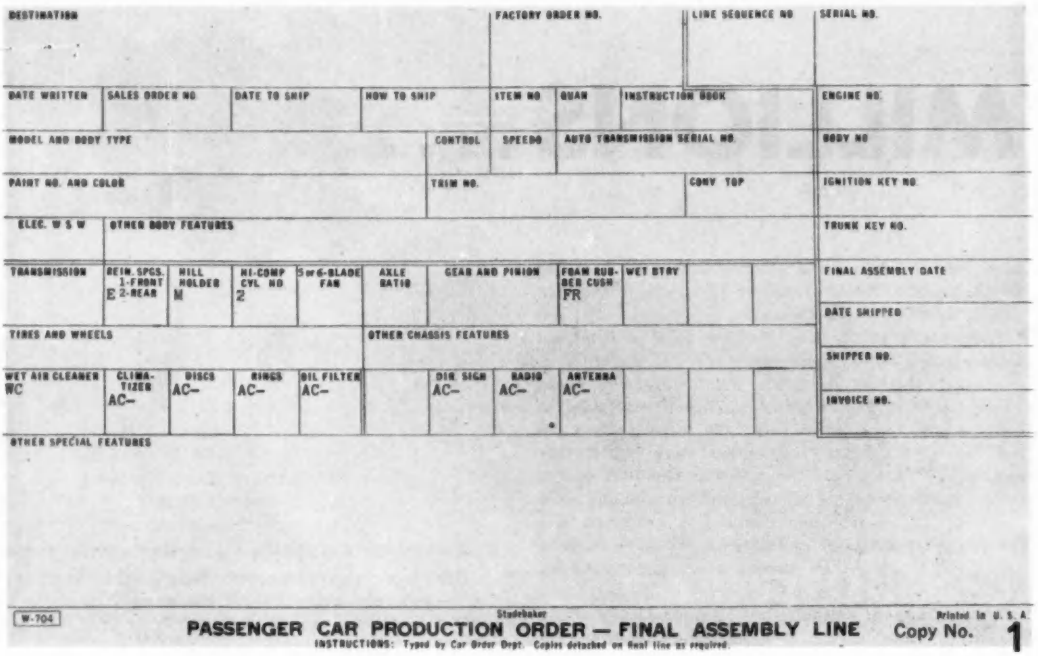
The first bracket in the denominator is the value of factorial five (5!) while the second bracket is factorial (n-r) or (13-5).

When the combinations of color and trim, tires, and other items going into the simple combination are multipled by 1287, how and why these numbers grow is easily seen.

By similar calculations, if there are 14 accessory options, in groups of seven, the total becomes 3432.

Sample IBM card used by Buick in scheduling car assembly.





DESTINATION | FACTORY ORDER NO. | LINE SEQUENCE NO | SERIAL NO.

DATE WRITTEN | SALES ORDER NO | DATE TO SHIP | HOW TO SHIP | ITEM NO | QUAN | INSTRUCTION BOOK | ENGINE NO.

MODEL AND BODY TYPE | CONTROL | SPEEDO | AUTO TRANSMISSION SERIAL NO. | BODY NO

PAINT NO. AND COLOR | TRIM NO. | CONV TOP | IGNITION KEY NO.

ELEC. W S W | OTHER BODY FEATURES | TRUNK KEY NO.

TRANSMISSION | REIN. SPGS. 1-FRONT E 2-REAR | HILL HOLDER M | HI-COMP CYL HD 2 | 5 or 6-BLADE FAN | AXLE RATIO | GEAR AND PINION | FOAM RUBBER CUSH FR | WET STRY | FINAL ASSEMBLY DATE

TIRES AND WHEELS | OTHER CHASSIS FEATURES | DATE SHIPPED

SHIPPER NO.

WET AIR CLEANER WC | CLIMATIZER AC– | DISCS AC– | RINGS AC– | OIL FILTER AC– | DIR. SIGN AC– | RADIO AC– | ANTENNA AC– | INVOICE NO.

OTHER SPECIAL FEATURES

W-704

Studebaker

PASSENGER CAR PRODUCTION ORDER — FINAL ASSEMBLY LINE

INSTRUCTIONS: Typed by Car Order Dept. Copies detached on final line as required.

Printed in U. S. A.

Copy No. 1

This is a special form used in scheduling Studebaker Car assembly.

In one case where the possible options actually run around 26, if 13 are taken at a time, the grand total becomes 305,900.

Another thing to remember is that the size of the group, i.e., the average number of items a buyer may select, exerts a terrific effect on the result by changing radically the value of the denominator.

Perhaps the analysis given above will earn more respect for the group of people in each plant who are concerned with the scheduling of paint lines, body trim lines, and sub-assembly and final assembly lines.

It is perfectly obvious that the job cannot be done without know-how, organization, and equipment for performing the scheduling function. To the initiated it is not a confusing problem since it has been with them for a long time. Yet even the experts worry a little at the beginning of a new model production when changes in options first start. A mis-match of a single item on the final line, such as a wrong wheel color, will upset the entire setup for hours. And this has happened.

Scheduling is an engineering art. In addition to proper organization, coupled with know-how, complete control is effected through the establishment of scheduling stations at critical points in the plant. These stations, in turn, are controlled from a central station usually communicating by telautograph or Teletypewriter.

Although each plant has its own way of handling scheduling,

This simple form handles the scheduling of Chevrolet car assembly lines.

GSD 900 Rev. 10-50

ZONE | ORDER NO. | APPROXIMATE SHIPPING DATE | MODEL NO.

CHARGE TO | COLOR

TIRES - FRONT

SHIP TO | TIRES - REAR

O. B. A. C. | TRANSMISSION

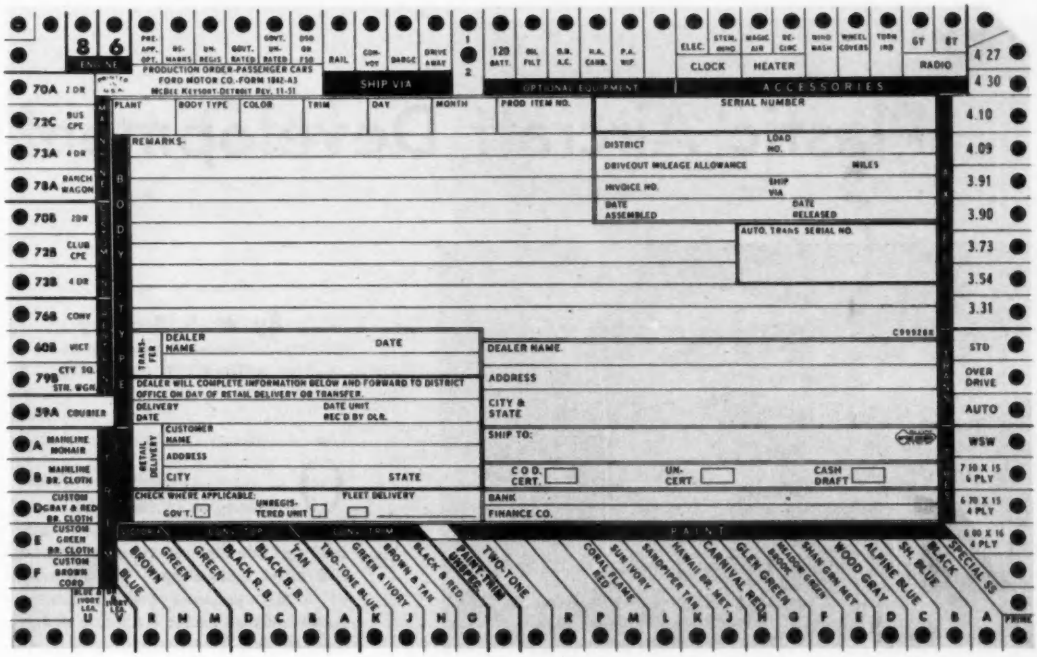
GMAC BRANCH | DEALER'S ORDER | VACUUM BOOSTER | SPRINGS

PA | DP | SDBL | CASH | BANK | DELUXE EQUIPMENT | OIL FILTER

OTHER OPTIONS AND SPECIAL INSTRUCTIONS: | CHROME GRILL | AXLE

SHOCKS - F & R | REAR BUMPER

H. D. CLUTCH | AUX. SEAT



Here is the type of form required for scheduling Ford car assembly.

there are similarities apparent to the practitioner. At Cadillac, scheduling stems from building all components in synchronization with the final assembly line, keyed to the receipt of bodies built to the specific customer retail order. At Cadillac the cycle from the selection of a customer order to the shipment of the car takes six working days.

· Cadillac distributors and dealers place their orders monthly with the factory on a predetermined allotment basis by body style. Each day at 4:00 PM a day's volume of orders is pulled from the distributors' files, in order of preference, by body style to equal the daily schedule. These orders are delivered to the body plant by 12:00 PM the next day.

The Fleetwood Div. of Fisher Body then builds bodies in conformity with specifications as to body style, color, trim, upholstery, etc. On the fourth day these bodies are delivered to the Cadillac plant on an hourly schedule. The order in which six bodies are loaded on a haulaway truck is the order in which they come off the final assembly line.

The shipper for bodies is prepared on a teletypewriter in the Fleetwood shipping room and the same message is transmitted to the receiver in the Cadillac broadcasting room. At this point the broadcast clerk pulls the distributor orders for the specific bodies and numbers them in numerical sequence. The sequence controls the engine and serial number of the car as well as the order in which the cars will be built.

As the body is received at Cadillac, it is inspected, and the order of receipt is broadcast by teletypewriters to 15 key stations in the manufacturing departments, loading dock, accounting, etc.

The broadcast order, prepared by perforating an IBM card, as illustrated, provides complete specifications for the car, specifies the color of sheet metal such as hoods, fenders, etc., lists equipment options, and accessories. It is produced in a sufficient number of copies to take care of invoicing, shipping, accounting, pay points, etc.

This procedure, quite common in most plants, except for local variations, makes unnecessary the storing of large banks of finished sheet metal parts, and eliminates the need for large banks of engines and other major components.

Scheduling at Buick too is handled by teletypewriters, using an IBM card of somewhat similar character.

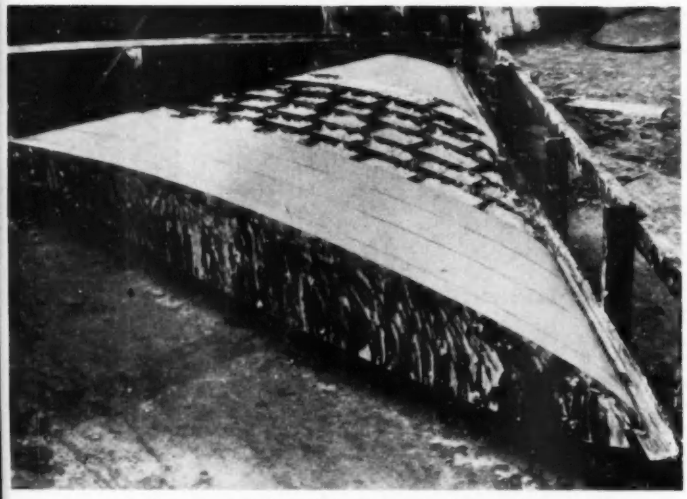
Packard employs teletypewriters for scheduling but uses a different kind of IBM card, as illustrated.

Chevrolet uses a special form, shown here, which is prepared by the Zone office and serves to initiate the building of a specific car. It is based upon the customer's order placed with the dealer and forwarded to the Zone. Another order based upon the order from the Zone is filed with Fisher body. When the body has been delivered to Chevrolet, the copy of the first order is picked up and follows the body through to shipment of the car.

Chevrolet assembly line and paint line scheduling is handled by Telautograph. The master station is

(*Turn to page* 86, *please*)

Plastic Aircraft Development



1 *Construction of the mold for plastic wing begins with the building of a model of the wing's exact size and shape. This master is made of plaster with a steel framework.*

2

A completed plaster model coated with sheets of asbestos plastic. After heat treatment, the plastic hardens and can be removed from the master. It then forms the female fold for the wing.

By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

LONDON, ENGLAND

OUTSTANDING in the plastic section of the British Industries Fair, held in London last month, was a full sized delta-shaped plastic wing of highly polished molded plastic, manufactured under a process developed by the Ministry of Supplies, at its Royal Aircraft Establishment at Farnborough, Hants. This is the first pioneer step towards the all-plastic aircraft which promises to cut manufacturing costs 50 to 80 per cent compared with conventional construction. Further, the production process is said to require comparatively simple tools. Although tests on the prototype wing are not yet completed, the British claim that the all-plastic aircraft will make its first flights within two years, and that gliders, on which experiments are now being carried out, will take the air even sooner.

The delta wing is the result of several years' research by scientists of the Royal Aircraft Establishment. Plastic materials are of course widely used for aircraft components, but most of these are comparatively small and carry only a light structural load. To mold complete aircraft structures in large pieces, the research workers had not only to find new materials capable of withstanding heavy stresses and strains, but also a cheap and simple production system.

The high capital cost of conventional methods of molding plastics, which involve steel dies and expensive high-pressure equipment, can be recuperated only by long production runs on simple articles which

Nears Goal

is impossible in the case of aircraft.

The material from which the delta wing is made is known as "Durestos," manufactured by Turner Brothers Asbestos Co., Ltd., of Rochdale, Lancs. It consists of asbestos fibres bonded together by a phenol-formaldehyde resin to form large, soft, felt-like sheets. This plastic has been used by the R.A.E. scientists for most of their work, although they have also experimented with a variety of similar materials, including some incorporating fibres of cellulose, paper and glass.

Two techniques have been developed by the Establishment for mold-

(*Turn to page* 88, *please*)

Completed delta-shaped wing of highly-polished plastic material.

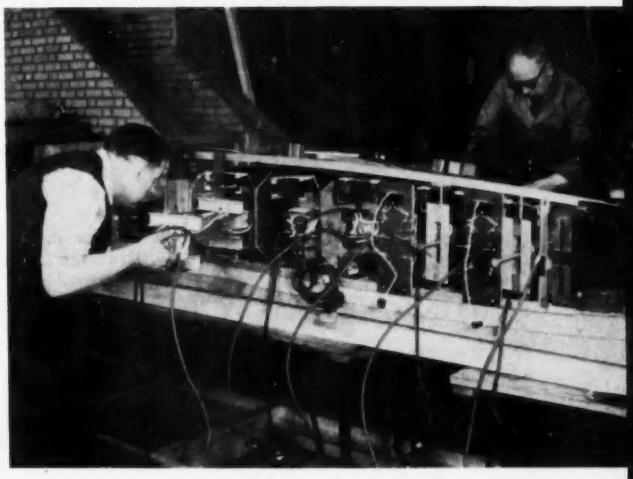
5

3

A blanket incorporating electric elements, is placed in the loading fixture.

4

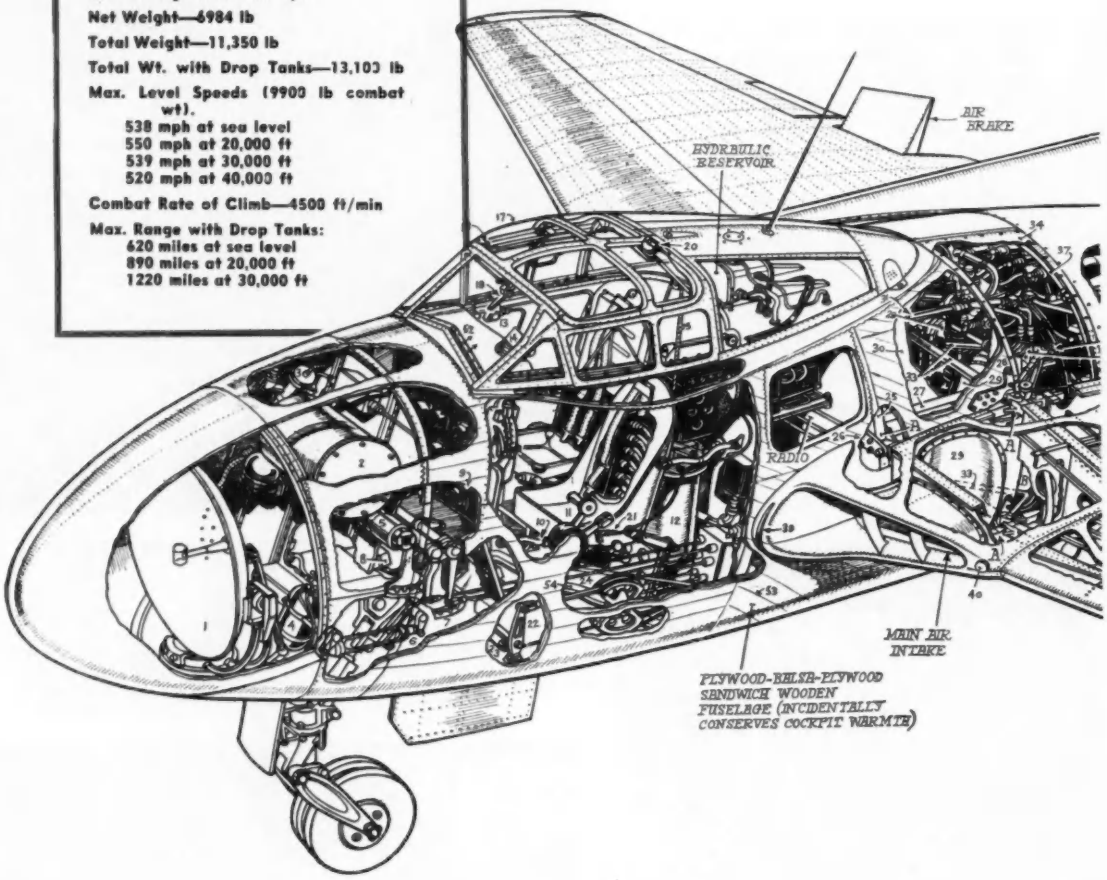
After withdrawal from the mold, the wing is separated into outer and inner shells. As shown, supporting studs are fitted into it.



The Vampire 10

Vampire 10 Specifications

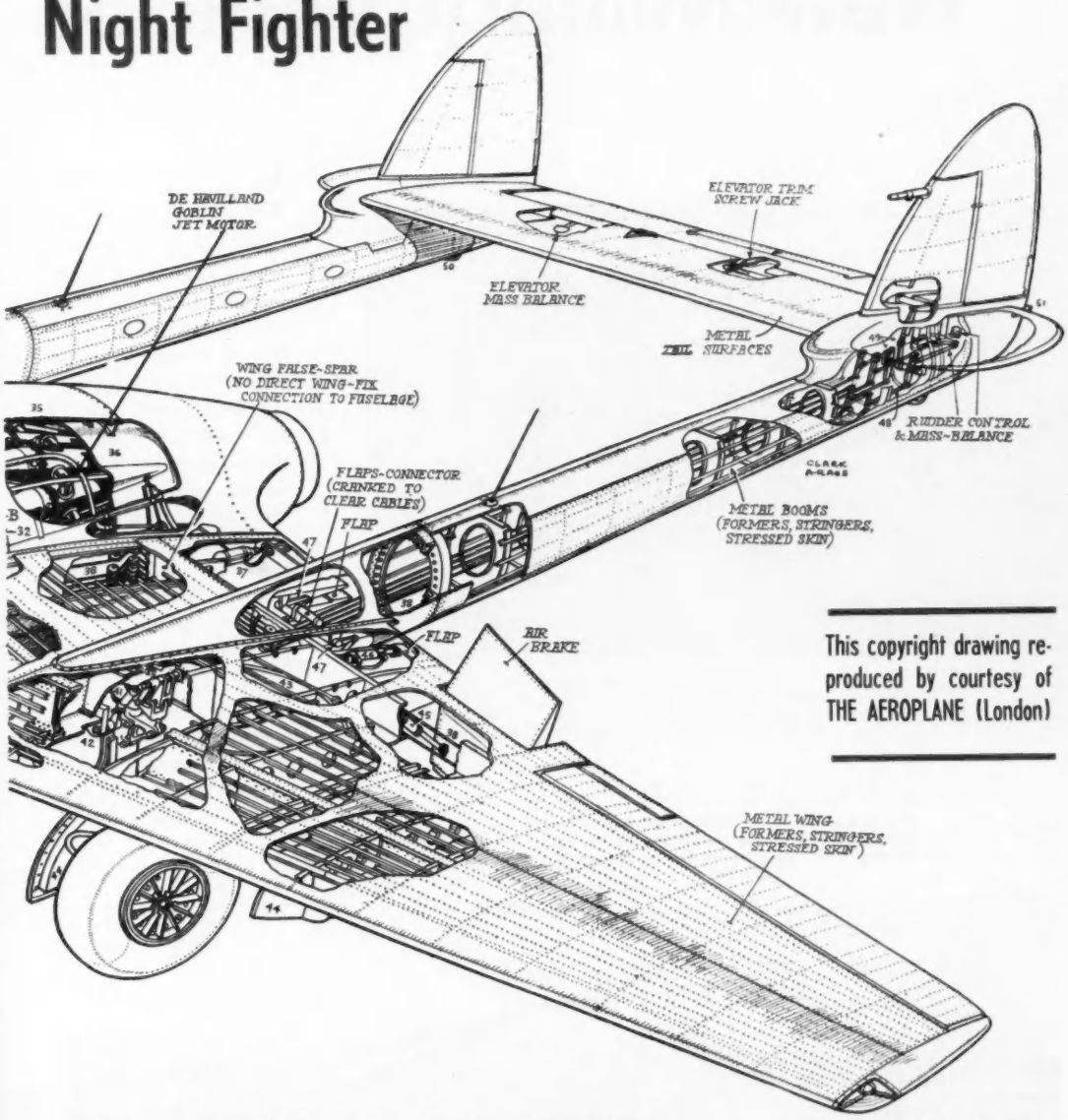
Manufacturer—de Havilland
Engine—Goblin 3 turbojet
Static Thrust—3350 lb
Span—38 ft
Length—34 ft 7 in.
Height—6 ft 7 in.
Gross Wing Area—261 sq ft
Net Weight—6984 lb
Total Weight—11,350 lb
Total Wt. with Drop Tanks—13,100 lb
Max. Level Speeds (9900 lb combat wt).
538 mph at sea level
550 mph at 20,000 ft
539 mph at 30,000 ft
520 mph at 40,000 ft
Combat Rate of Climb—4500 ft/min
Max. Range with Drop Tanks:
620 miles at sea level
890 miles at 20,000 ft
1220 miles at 30,000 ft



KEY

1. Radar scanner.
2. Frequency unit.
3. Glycol tank for windshield de-icing.
4. Two oxygen cylinders.
5. Scanner motor generator.
6. Nosewheel operating jack.
7. Adjustable rudder pedals.
8. Brake differential unit (operated from rudder pedal shaft.)
9. Instrument panel.
10. Hydraulic hand-pump.
11. Throttle.
12. Frequency modulator.
13. Oxygen regulator for navigator.
14. Gun sight.
15. Seat lifting elastic cord.
16. Seat-raising handle.
17. Fold-back canopy pegged all round as 18 and released by handle 19.
20. Emergency (hydraulically operated) canopy release jack.
21. Harness release.
22. Elevator.
23. Aileron cables.
24. Rudder cables.
25. Wooden bulkhead carries wing drag fitting.
26, 27 and 28. Wing attachments.
29. Engine air intakes (passes through firewall 30).

Night Fighter


DE HAVILLAND GOBLIN JET MOTOR
ELEVATOR TRIM SCREW JACK
ELEVATOR MASS BALANCE
METAL TAIL SURFACES
WING FALSE-SPAR (NO DIRECT WING-FIX CONNECTION TO FUSELAGE)
RUDDER CONTROL & MASS-BALANCE
FLAPS-CONNECTOR (CRANKED TO CLEAR CABLES)
FLAP
METAL BOOMS (FORMERS, STRINGERS, STRESSED SKIN)
FLAP
AIR BRAKE
METAL WING (FORMERS, STRINGERS, STRESSED SKIN)

This copyright drawing reproduced by courtesy of THE AEROPLANE (London)

31. Hot-air bleed from engine compressor to cabin with intercooler (**32**) on bypass.
33. Tubular cross tie between wing fixes, and engine mountings.
34. Inspection door.
35. Metal casing shrouds engine and jet-pipe; and is lightly connected to wing rib.
36. Light casing around jet-pipe (part of the engine).
37. Fire extinguisher and spray ring.
38. Aileron, rudder, elevator and trim cables run behind false spar.
39. Slight indentation preserves airflow over wing (prevents fuselage air flow from breaking away and going round into duct).
40. Cooling air for cabin intercooler and total head.
41. Undercarriage operating jack.
42. Undercarriage hinge.
43. Undercarriage wheel well.
44. Wheel door and leg fairing.
45. Air-brake operating jack.
46. Flap jack.
47. Flaps interconnection rods.
48. Rudder linkage.
49. Elevator linkage.
50. Tail-down bumpers (skid pads).
51. Tail navigation lights.
52. Warm-air windshield defroster.
53. Ply jointing.
54. Cabin air discharge valve.
A. Four engine pick-ups.

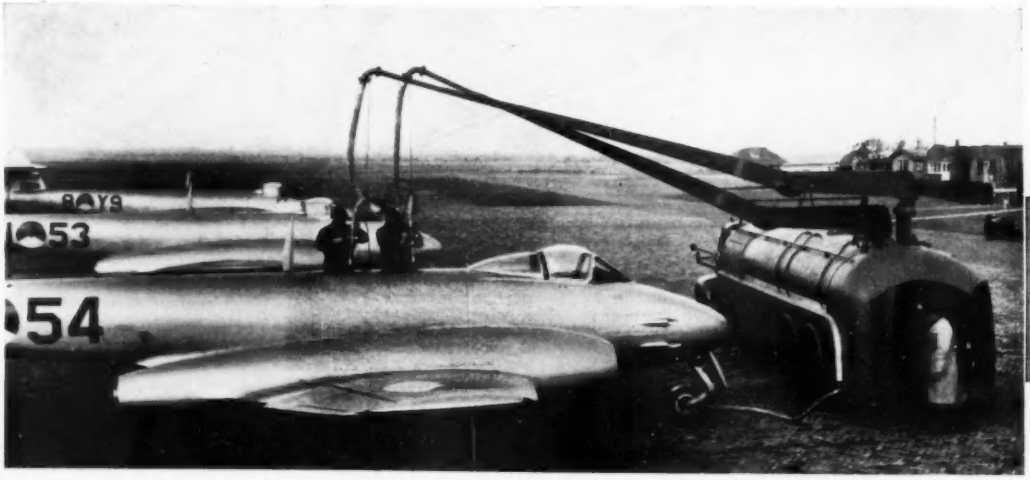
New Military Vehicles

Front wheels of the 2½-ton, 6x6 artillery prime mover are independently sprung by means of torsion bars. Rear bogies have leaf springs, and central drive for each bogie.

SOME interesting vehicles for use in the Dutch army have been developed by van Doorne Automobielfabriek, Eindhoven, Holland. The Dutch government, with help from the American Mutual Security Agency in the Netherlands, already has placed orders totaling about $46 million for 6x6 artillery prime movers and 4x4 weapon carriers. Van Doorne expects to receive orders soon for the Jeep.

All vehicles are powered by Hercules gasoline engines, imported from the United States. The four-cyl, 60-hp JX4C engine is used for the Jeep, and the 103-hp JXC engine for the 6x6 and the weapon carrier. Many other units also

Van Doorne tank trailer for quick refueling of jet fighters. Filler hoses are brought into position by swinging booms, and tanks are filled at the rate of 265 gpm.



Developed in Holland

are of American manufacture.

Synchromesh transmissions and two-speed, centrally located transfer cases are used in the vehicles. From the transfer case, which incorporates a differential, propeller shafts drive the wheels through reduction gears, one of which is located at each wheel. The Jeep is normally front wheel driven, but it is possible for the driver to engage rear drive by a dog clutch in the reduction gear of the rear wheels.

Another van Doorne development is a tank trailer for fast refueling of jet planes. As illustrated, two swinging booms are provided to eliminate manual lifting of the fuel hoses.

This Dutch-built Jeep has six forward ratios and two reverse ratios. Drive is normally through the front wheels, but rear wheel drive also may be engaged.

All wheels of the 4x4 weapon carrier are independently sprung by transversely mounted torsion bars.

Vehicle Components in Army Operated Plant

Axle straightening process in operation. When axle is in alignment, lamp bulb (at right end of axle) can be seen through four gages placed in the housing. U. S. Army photo.

THE Tokyo Engineering Works has the principal job of supplying quality rebuilt major automotive assemblies such as engines, transmissions, transfer cases, etc., plus accessories and subassemblies, to the Far East Command. It is located between Yokohama and Tokyo at the Maruko plant of the East Japan Heavy Industries, Ltd. It comprises 40 acres with 85 buildings having more than 1.5 million sq ft of covered floor space. Formerly the plant was the property of Mitsubishi Heavy Industries, Ltd., and during the war was used to manufacture Japanese medium tanks.

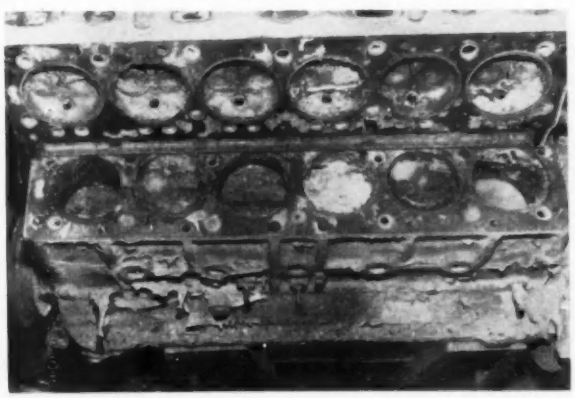
East Japan Heavy Industries is the contractor for the work with a Japanese general manager in charge of the plant. Actual management of the operation, however, is under the Ordnance Corps, which owns and controls all of the equipment and tools, and which furnishes the supplies necessary.

Engines rebuilt at the plant include those for the Jeep, the GMC 2½ ton, and the Dodge ¾ and 1½ ton trucks.

About half the machinery used at the Tokyo Ordnance Works is reparations equipment. Of the total machinery in the plant, however, 70 per cent is American built with the balance of foreign manufacture including Japanese and German machines. Japanese made tools, according to one Ordnance official, are good copies of American equipment, but do not hold up as well.

The whole operation is highly mechanized, and the influence of American mass production techniques is very much in evidence. Everything that can be moved by power equipment is handled by hoists, conveyors, and other materials handling devices. An interesting point is that because of the smaller stature of

Carbon and corrosion on the head and pistons of an engine as received at the Tokyo Ordnance Works. U. S. Army photo.



Rebuilt at Tokyo

By
Leonard Westrate

In the Article, Which Appeared in the May 15 Issue of Automotive Industries, the Author Described How Army Vehicles Are Reclaimed in the Ordnance Shops at Oppama, Japan. Here Is an Account of the Plant That Rebuilds Major Assemblies and Subassemblies for Reclaimed Vehicles.

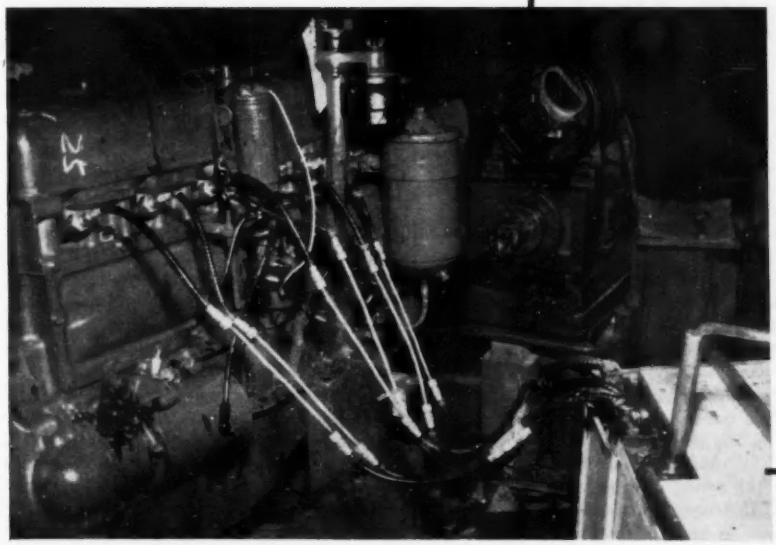
Japanese workers assembly lines had to be installed at a lower height than would be convenient for American workers who generally average taller.
(*Turn to page 82, please*)

Maintaining World Leadership

GENERAL Matthew B. Ridgway has made a very interesting observation about the impatience of the American people to get a quick decision and get out of Korea. He points out that America now has world leadership—no matter how we got it — whether it devolved upon us or we actively sought it—and if we are to maintain it we must take an entirely different viewpoint. He said that the fall of Japan to the Communists would be a major calamity to this country, and the attitude of business and labor in America toward markets from Japanese industry may have a very important bearing on what happens there.

If we close our markets to the Japanese and make it too difficult for them to make a living, we possibly could drive them right into the arms of the Communists. General Ridgway is convinced that there is no easy or quick solution to the whole world problem, and that it is going to take a long time, with readjustments and realignments continuing indefinitely in the future. He says if the United States is going to meet its responsibility, it must grow up and be more mature in its attitude, and not expect a finite solution in one, two or five years, but for a continuing long term stand against the forces of Communism.

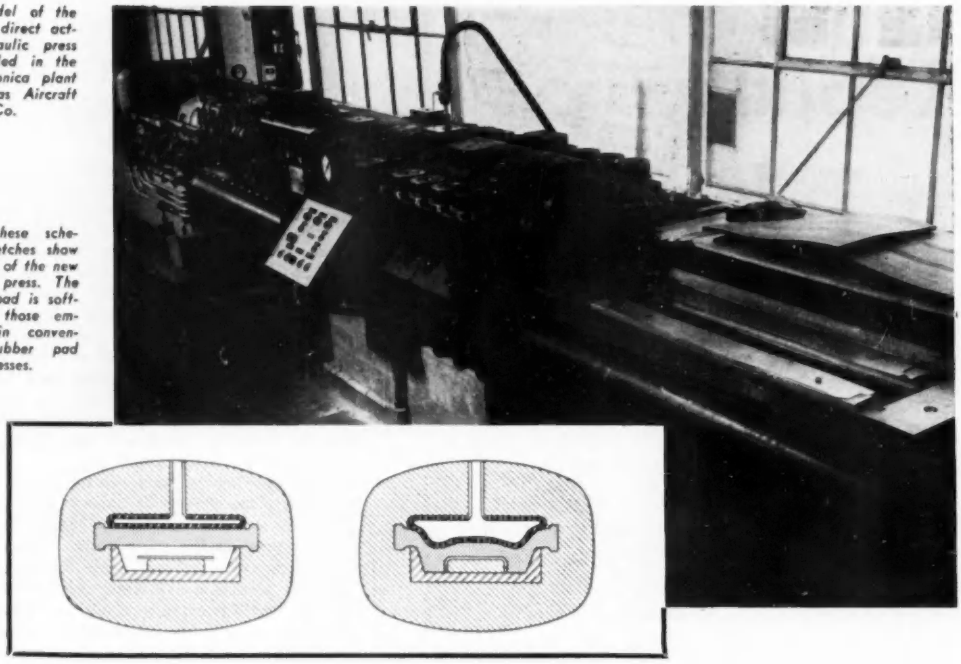
He pointed out also that the Asiatics can absorb a tremendous amount of punishment since they are conditioned by centuries of famine, flood, corruption, pestilence, cold exposure, and all manner of hardships.



A Diesel fuel pump is used to provide solid injection of preservative oil for internal parts of rebuilt engine. U. S. Army photo.

Pilot model of the Wheelon direct acting hydraulic press as installed in the Santa Monica plant of Douglas Aircraft Co.

Below, these schematic sketches show operation of the new Wheelon press. The working pad is softer than those employed in conventional rubber pad presses.



New Type Hydraulic Press

for forming

Aircraft Parts

A NEW type of hydraulic press one-tenth the size of conventional presses, yet capable of exerting higher pressures than those currently used to form sheet metal parts used in airplane construction, is in operation at Douglas Aircraft Co., Inc. Developed by O. A. Wheelon, production design engineer of the Douglas Santa Monica Division, the new tool is known as the Wheelon direct hydraulic press. It is designed to accomplish the relatively shallow forming which constitutes the bulk of sheet metal fabrication in airframe manufacture. This work is currently being done on Guerin type rubber pad presses.

In operation, the bag or fluid cell is mounted in the roof of the press, as shown in the schematic illustration. Inflating the bag with hydraulic fluid displaces the working pad down over the work. Normally the pressure is raised to 5000 psi to accomplish the actual forming. Lower pressures may be used, however.

The working pad is softer and has considerably more elongation than those employed in conventional rubber pad presses. In this way, pressures on the side of the block are as high as those on the face of the block.

To protect the working pad from the sharp raw edges of the work, auxiliary throw pads are recommended. The throw pads are preferably hard and serve to prevent the rubber from getting under the edges of the flanges, etc. It is only by maintaining this pressure differential in the work that forming is accomplished.

With this type of press there is no tendency to pierce a hole in the pad even when forcing a six-in. block into a six-in. pad of rubber. Due to the design there is no finite clearance through which the rubber extrudes as in the conventional pad container.

Construction of the press is simple, and low carbon steel is used throughout. The only foundation required is that necessary to bring the press to working height; this feature allows ready relocation as plant layout may require. Floor space occupied is at a minimum. Also, the press does not require excessive ceiling height—an eight ft ceiling is usually adequate.

Because of its construction, length of the press can be tailored to the customer's requirements with a minimum of tooling expense.

(*Turn to page* 128, *please*)

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Many Timely Subjects Discussed at 50th Spring Meeting of the NMTBA. Machine Tool Orders Increase as Cancellation Rate Drops.

50th Machine Tool Meeting

Machine conservation, tax policies, industry production problems, price, purchasing terms and finance, and the foreign market were major topics discussed at the 50th Spring Meeting of the National Machine Tool Builders Association. Held in Chicago last month, the well attended meeting was aimed at the ramifications of the current defense program.

Frederick S. Blackall, Jr., president of the NMTBA and president-treasurer of the Taft-Pierce Mfg. Co., spoke on a long-range machine tool program as a sound foundation for the national economy and for stability within the industry. Mr. Blackall's remarks concerning this subject were brought out also at the recent Westinghouse Machine Tool Forum (AUTOMOTIVE INDUSTRIES, April 15).

Federal tax law modification to permit rapid recovery of capital invested in industrial plant and equipment is one of the items advocated by Mr. Blackall. L. D. McDonald, executive vice president of Warner & Swasey Co., also discussed this subject at the meeting.

Only a short time ago Mr. McDonald appeared before a Senate subcommittee concerning tax regulation TD-4422 (see AUTOMOTIVE INDUSTRIES, May 1).

The NMTBA president would also like to see our Government maintain a permanent reserve stock of machine tools.

Renegotiation

In respect to renegotiation, the industry would like to have the principle of carry-back and carry-forward recognized so that it will not find itself financially prostrated by a period of depression.

Once again, the foreign competition situation was hit. This has been a subject of controversy for the past several months. The tool builders would like to have the Government call a halt to subsidizing foreign competition in the U. S. domestic tool market with U. S. taxpayers' dollars.

It was brought out that the development of machine tool industries in such countries as Italy, France, Germany and Great Britain has led to a flood of European machine tools flowing into the U. S., which according to latest statistics amounts to $1,350,000 per month and which is still growing. The manufacturers of these tools do not work under a Fair Labor Standards Act and they never heard of a Walsh-Healy Act. Foreign builders pay extremely low wages and they do not pay U. S. overtime rates. At the recent American Society of Tool Engineers' Exhibit in Chicago, a very substantial showing of German machine tools was made and 40 per cent of the cost was financed by the German Government with dollars secured, presumably from the Mutual Security Administration.

Tool Cancellations Decline

Machine tool order cancellations during March were at a much lower rate than in February, and new orders showed improvement. According to the NMTBA, cancellations in March are estimated at about $20 million, compared with $80 million in February. New orders showed an increase for the first time since December, climbing to an index of 327.1 from 318.8 the previous month. Higher production and shipments during March, plus cancellations, are estimated to have reduced the industry's backlog to 15.9 months at the end of March, compared with 17.1 in February.

YOUR JOB IS CLEAR —GET IN THE SCRAP to keep steel coming

NON-FERROUS SCRAP is needed too!

NMTBA Sets Up Speakers' Bureau

The machine tool industry is establishing a Speakers' Bureau through which machine tool executives can be made available as speakers at service clubs, schools, and business and civic organizations.

The Bureau was announced by W. L. Dolle, president of The Lodge & Shipley Co., Cincinnati, at the Spring Meeting of the National Machine Tool Builders' Association held at Chicago. Mr. Dolle is chairman of the Association's Public Relations Committee.

"Too few people," Mr. Dolle said, "understand what machine tools are and what they do and their relationship to the American standard of living. We believe that the public is interested in knowing more about our industry, which has such a direct bearing upon productivity and national defense."

Organizations interested in obtaining a speaker on machine tools or related subjects should write to the National Machine Tool Builders' Association, Cleveland, Ohio.

Gear Index

The American Gear Manufacturers Association index for March is 517.1. This is a decrease of 4.2 per cent under February. AGMA will hold its spring meeting at Hot Springs, Va., June 1 through 4.

Comparator Film

A new, full-color sound film—16 mm—has been released by Jones & Lawson Machine Co., Springfield, Vt. Within a 21 min running time, the film tells the full optical comparator inspection story—from comparison to precision measurement. Production line scenes were taken in plants using J&L equipment under actual working conditions.

NEW EQUIPMENT PLANT · PRODUCTION

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

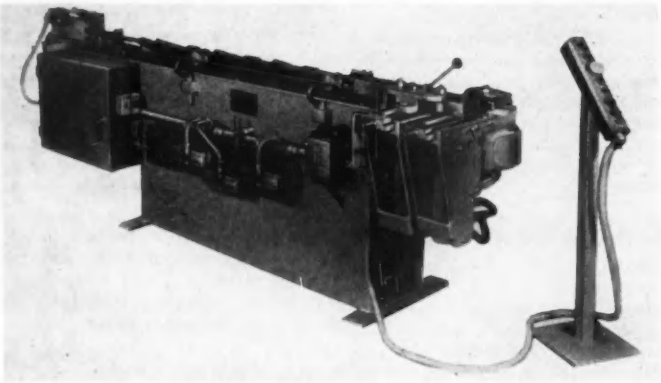
Aircraft Tube Bender Has New Operating Circuit

Now in production is the Size ¾ aircraft tube bender that features a new operating circuit that permits individual control of all functions at any time during the cycle. Details of the new circuit consists of an additional push button control panel that enables the operator to stop, start, or reverse the cycle at any given point. Mandrel, clamp die, and pressure die operate automatically or independently.

Another feature of the Bender is a new pick-off angle-of-bend turret, and a removable location-of-bend stop assembly, for repeat set-ups. The pick-off turret slips off the end of the bend-angle control shaft and may be stored like other tooling until needed for a repeat run. In a similar manner, and for the same purpose, the location-of-bend stop assembly is also designed for easy removal.

Other features include a calibrated scale as optional equipment for setting the degree of bend. There are also provisions for mounting Parker-type twin stud bending forms. Panel-mounted hydraulic valves are also included. Hydraulic lines are connected so that shock is absorbed.

The machine itself is about three ft shorter than former models, and accommodates a tube seven ft in length over the mandrel. For longer tube lengths, base extensions can be provided as required. The same production bending rate of former machines of standard ¾ in. pipe capacity is retained. Bending arm speed is 25 rpm. Size ¾ aircraft bender will handle stainless steel tubing 1 in.-16 Gage, I.P.S. extra heavy pipe up to ¾, and nonferrous metals 1¼ in.-0.134 wall as well as extruded shapes within its capacity range. Maximum standard radius adjustment is 10 in. The machine is powered by a five hp motor driving a Vickers hydraulic pump. *Pines Engineering Co., Inc.*



Pines aircraft tube bender, Size ¾.

Circle E-1 on page 65 for more data

Unit Work Benches for Continuous or Single Work Stations

Work benches having standard units which can be tailored to fit space and other needs and having large storage facilities, have been placed in production.

Latest addition to the SPS Hallowell line of shop equipment, the work benches, identified as the 640 Series unit work benches, can be used as continuous benching or as single work stations.

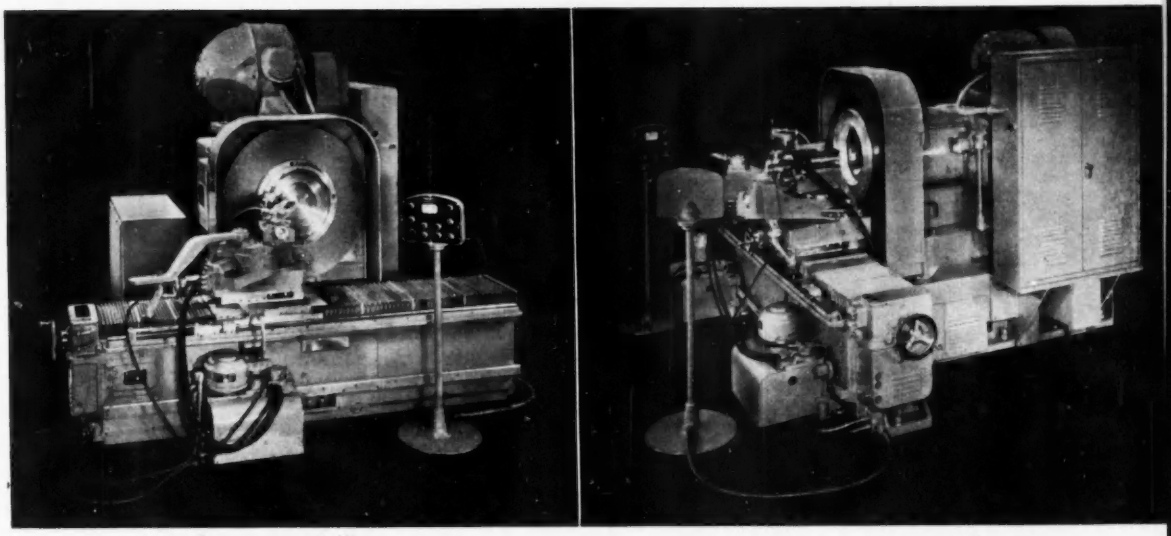
The benches come in three basic models. Model 640 is made up of a top, two pedestals—one a drawer unit and the other a cabinet unit—and two bases. Model 643 includes a top, two drawer units and two bases. And 646 is assembled with top, two cabinet units and two bases.

The 640 Series comes in two heights, 31¼ in. and 33½ in., depending upon which of two standard bases, 4½ in. or 6¾ in., is used.

Drawers glide on rollers, have individual cylinder locks and recessed drawer pulls. The inside drawer dimensions are 20-in. deep, 14-in. wide and five-in. high. Cabinets have an adjustable shelf and chrome-plated locking handles. Inside dimensions are 20½-in. high, 20-in. deep and 14-in. wide.

Tops are available in steel, Presdwood-covered steel or laminated wood. They come in five-ft and six-ft lengths and in nominal 24-in. and 30-in. widths. For continuous benching, they can be butted end to end or joined with two tops resting on the same drawer or cabinet pedestal. The 640 Series benches are interchangeable with Hallowell benches of similar dimensions. *Standard Presed Steel Co.*

Circle E-2 on page 65 for more data



Monarch Model F constant surface speed right lathe is shown at left while the Model O constant spindle speed unit is shown at right.

Automatic Right Angle Lathes for Jet Engine Parts

Fast, accurate machining of jet engine rings, vanes, disks, wheels and other components is claimed with the use of two 60-in. right angle lathes designed specifically for this purpose.

The machines are equipped with right and left power angular slides to which are also added Air Gage Tracer units for control of contouring operations on outside and inside diameters, or faces from thin metal templates.

One lathe, Model F, is a constant surface cutting speed machine which has been so designed that the tool may operate on both sides of center for the finish facing of jet engine disks, wheels and comparable parts.

The other lathe, Model O, has a 16-speed, helical-geared headstock and for maximum productivity is supplied with two slides, one for the turning operation, the other for the boring operation. One of the slides is always Air-Gage Tracer controlled. Both slides may be controlled in this manner which makes it possible to produce many work pieces complete at one chucking. In some cases, both slides may be operated simultaneously, thereby reducing production time still further. This lathe has been developed particularly for the finish turning and boring of jet engine rings, vanes, shrouds and work of similar shape.

Both Model F and Model O machines take either a 40-in. or a 52-in. face plate (with suitable splash guards). Work up to 60 in. diam may be swung in the gap as long as its thickness, or the combined thickness of the work and the holding fixture, does not exceed 14 in. Air operated or manually operated chucks may be used although neither is considered a part of regular equipment.

The constant surface cutting speed feature permits automatic spindle speed control. Satisfactory finish over the entire face of the work piece is said to be secured regardless of extreme diameter variation. A further advantage is that the tool life is measurably improved.

Automatic spindle speed control is timed with the tool slide which travels at a right angle to the spindle. Speed variation, controlled by a speed control template, is always eight to one. The regular speed control template gives automatic speed control over a diameter range from 32 in. down to 4 in. Assuming a main drive motor speed of 200 rpm at a 32-in. diam, the speed of this motor is 1600 rpm at a 4-in. diam. A speed control template may be furnished to give automatic spindle speed control over larger or smaller diameter ranges.

Pick-off gears, readily accessible behind a cover on the front of the headstock, provide the desired surface cutting speed. Seventeen sets of these gears are available covering a range of 125 to 800 fpm.

The feed and traverse unit of both Models F and O is individually motor driven. Through two motors, this unit provides power feed or power traverse in either direction at 90 deg to the spindle and power feed or power traverse in either direction to the swiveling compound rest. Power travel on both sides of the spindle center is sufficient for work up to 48-in. diam. On Model F the gear box is mounted at the left of the bed; on Model O gear boxes they are mounted at both ends.

Headstock of the Model O is a 16 speed helical geared type with individual motor drive. From the motor mounted on top of the headstock, the drive is by means of multiple vee belts. With the regular 1800 rpm motor, spindle speeds range from six to 303 rpm. As with the Model F lathe, the headstock position is adjustable over a total travel of 12 in.

The work drive motor regularly supplied with Model O machine is a 20 hp, 1800 rpm constant speed type. Where the work requires speeds outside the regular range, a 20 hp, 500/1500 rpm d-c motor is used. It provides a range from three to 455 rpm. Control equipment consists of a reversing magnetic starter with overload and undervoltage protection and start, stop and reverse push button station.

Complete push button control is an important feature of both machines. The turning cycle is fully automatic. Both longitudinal and angular cross feed are infinitely variable. *Monarch Machine Tool Co.*

Circle E-3 on page 65 for more data

(*Turn to page* 60, *please*)

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 65

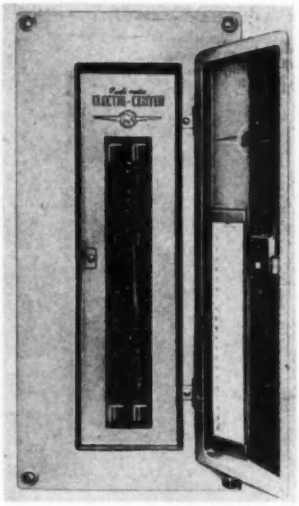
(*Continued from page* 59)

General Purpose Panelboard

The PB Electri-Center, a general purpose circuit breaker panelboard for controlling lighting and appliance circuits has been put on the market. It is rated one phase, three wire, solid neutral, 120/208 v a-c with 100 amp main wire grips or three phase, four wire, solid neutral, 120/208 v a-c with 100 amp main wire grips. It is listed by Underwriters' Laboratories as an "Inspected Panelboard."

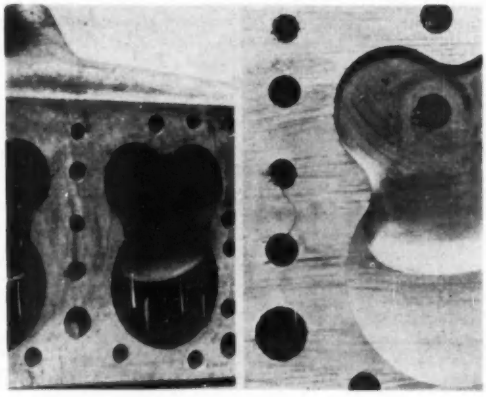
PB panelboards are available in two sizes, 14 or 20 circuits. The unit contains box, interior, two 15 amp Pushmatic breakers and two 20 amp Pushmatic breakers. Additional breakers, filler plates and fronts (flush and surface) are supplied to suit the customer's specific needs. Doors with locks are available if desired. *BullDog Electric Products Co.*

Circle E-4 on page 65 for more data



BullDog general purpose circuit breaker panelboard, PB Electri-Center.

Dye Penetrant Process for Parts Inspection



Met-L-Chek process being used on an automobile engine cylinder head.

For detecting cracks, pores, and cold shuts in ferrous, non-ferrous, ceramic, glass and thermosetting plastic parts, a dye penetrant process has been developed that requires two solutions. Called Met-L-Chek, the process uses a red dye and a white developer.

In use, the parts to be inspected are coated with the penetrant dye solution. This penetrates any cracks or pores within three min. Surface dye is then washed away with water and the parts are coated with the white developer. As this dries it absorbs the dye from any defects in the part. *Met-L-Chek Co.*

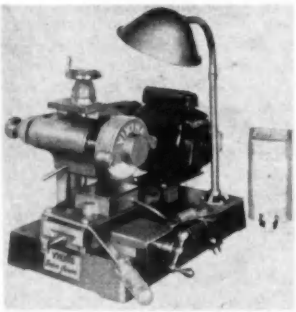
Circle E-5 on page 65 for more data

Bench-Type Precision Surface Grinder

A bench-type precision surface grinder that features an extra heavy head stock, micrometer adjusting dials, and a precision spindle with heavy duty ball bearings is now on the market.

Included as standard equipment is a compact Viking magnetic chuck. The machine is powered by a ⅓ hp continuous-duty dual-voltage motor, and is designed for mounting a four-in. diam wheel. Wheels of ½ in. by ½ in. by 4 in. are recommended.

This machine can also be converted to a milling machine or a bench lathe. Interchangeable pulleys make it possible to obtain a range of speeds up to 7000 rpm. A No. 7 Brown & Sharpe Taper is standard equipment.

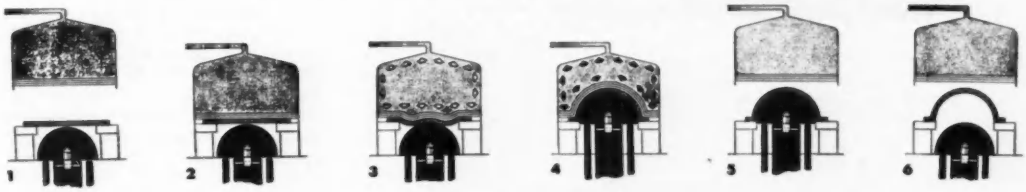


Viking precision surface grinder.

An adjustable pilot light is mounted on the base of the machine. The size of the base is 11 in. by 18 in. Table working surface is 9½ in. by 6 in. Surface size of the magnetic chuck is 3⅝ in. by 3⅛ in. Overall height of the chuck is 1 5/16 in. A convenient unit with switch for demagnetizing can also be provided. The table is mounted on a dove-tail way, and is traversed by hand lever. New-type micrometer dials for vertical and cross feed adjustments are graduated in 0.001 in. *Viking Industries.*

Circle E-6 on page 65 for more data

Metal Forming Machines Use Hydraulically Pressurized Die Member



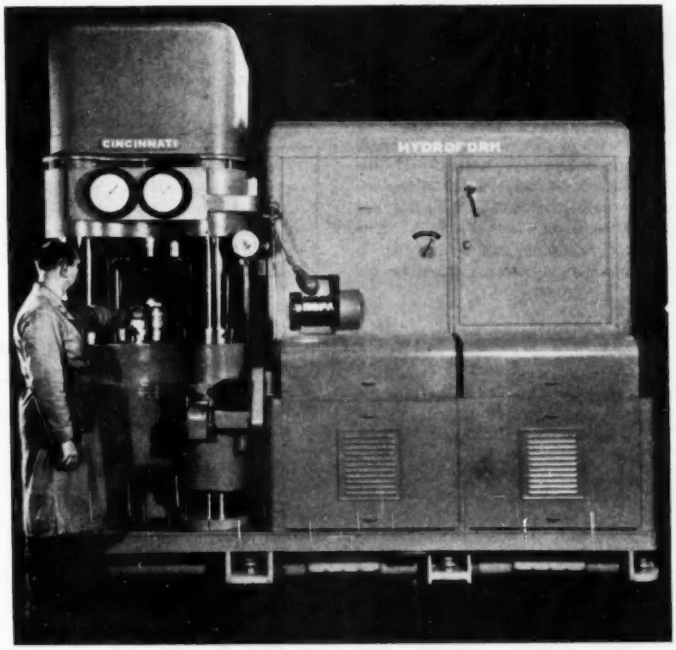
Blank is placed on draw ring. *Flexible die member is lowered and locked into position.* *Pressure in flexible die member is established to a setting.* *Punch is moved upward into flexible die member.* *Flexible die member is raised.* *Punch is stripped from finished part.*

A line of metal forming machines, operating on a unique principle, have been recently introduced. Known as Hydroform, the machines are now marketed in 12-in. and 26-in. sizes, and can be made in sizes up to 40 in.

Hydroform machines operate on the principle of a solid punch member moving into a flexible, hydraulically pressurized die member; actually an oil cavity capped with a flexible diaphragm. Sheet metal between these two members is hydraulically formed to the shape of the punch. In operation, the flexible die member is lowered and locked, initial pressure is released, and then the punch member moves upward into the flexible die member. The blank is pressed tightly against the draw ring (surrounding the punch) to control metal flow. As the punch moves up, pressure is automatically increased on the blank being formed, and the metal is subjected to uniform pressure from all sides. Stripping is accomplished automatically as the punch is retracted. Tools consist of a draw ring and a punch made to the shape of the part being formed.

Hydroform machines consist basically of the heavy base in which the bolster plate and punch are mounted, a dome which contains the flexible die member, and four strain rods for containing these units. The hydraulic system is equipped with a cooling unit to maintain the proper oil temperature. Electrical push buttons, manual control levers, and setup elements are all grouped at the operator's working position. An automatic cycle control unit is arranged with adjustable dogs or master cam plates to control the complete cycle, including increased pressure in the dome, if desirable, while the piece is forming. Maximum pump pressure developed by the hydraulic system is 8000 psi, although up to 15,000 psi may be generated in the flexible die member as the punch moves up during the forming process.

The dome is interlocked in its up position while loading and unloading, and in its down position while the work is being formed. The dome control lever can be moved only after a function has been completed. A two-position form speed control lever regulates the speed of the forming stroke, giving a choice of high or low forming speed to suit the material and size and shape of the part. The flexible diaphragm unit is made up from two layers of material; (a) the wear sheet and (b) the inner member which confines the hydraulic oil in the forming cavity. *Cincinnati Milling Machine Co.*



Cincinnati 12-in. Hydroform machine.

Hydroform Specifications

	Model 12	Model 26
Work Capacity:		
Max. blank diam.	12"	26"
Max. draw depth	7"	12"
Max. flexible die member pressure	15,000 psi	15,000 psi
Max. blank gage	1/16" steel	1/8" steel
Machine operating rate:		
Max rate	180 cph	90 cph
Weight:		
Machine net	38,600 lb	162,000 lb

Circle E-7 on page 65 for more data

(*Turn to page 62, please*)

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 65

(*Continued from page* 61)

Snap Action Switch

A snap-action switch designed for high-precision performance in cam actuated service has been announced as available. It has the capacity to make or break steady state currents of 20 amp and to handle inrush currents as high as 75 amp according to the manufacturer.

This design has a roller plunger actuator adapted to operation by cams with a rise of up to 30 deg. Catalog listing BAF1-2RQ9-LH has the plunger on the left side of the enclosure, and the BAF1-2RQ9-RH has the plunger on the right side. The plunger assembly can be turned to any position necessary to align its roller with the directon of cam approach. A nut is then tightened down, clamping the plunger assembly securely in position.

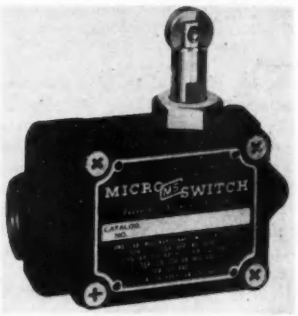
The die-cast aluminum enclosure is designed to protect the basic switch against damage from vibration and shock, and the cover is sealed against dust, dirt, oil, and moisture. There are three ¼ in. holes in a flange at the back of the enclosure for mounting.

CHARACTERISTICS

Operating Force	2½ lb, max
Release Force	¾ lb, min
Pretravel	3/32 in., max
Differential Travel	0.010 in., max
Overtravel	0.187 in., min
Weight	0.55 lb, approx.

Catalog listings BAF1-2RQ9-LH and -RH are single-pole, double-throw switches. Underwriters' Laboratories list these switches as follows: ¾ hp 115 v a-c; 1½ hp 230 v a-c; 20 amp 125, 250, or 460 v a-c; 10 amp 125 v a-c "L"; ½ amp 125 v d-c; ¼ amp 250 v d-c. ("L" rating denotes suitability for controlling tungsten filament lamp load on alternating current.) *Micro Switch, Div. Minneapolis-Honeywell Regulator Co.*

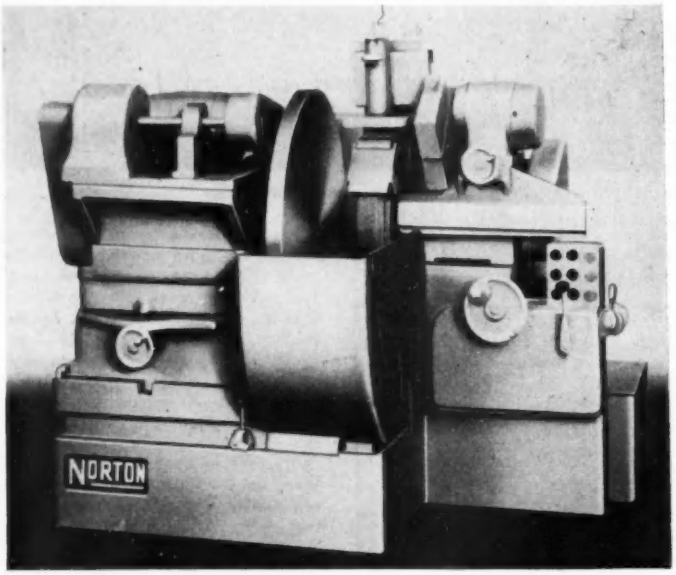
Circle E-8 on page 65 for more data



Micro Switch snap action switch.

Compressor Wheel Grinding Machine

Incorporating special features, a machine has been developed that is said to simplify grinding operations on jet engine compressor wheels or similar work. The workhead spindle is designed for convenient mounting of face plates, chucks, or other workholding fixtures. Work up to 42-in. diam can be accommodated. Workhead is mounted on a swivel table and has longitudinal and cross adjustments. The workhead table also has longitudinal power traverse with automatic reversals from a hydraulic motor unit.



Norton compressor wheel grinder.

To minimize manual tasks in external grinding operations, an automatic feed cycle, timer controlled, is furnished. A hand wheel feed mechanism is also provided.

For truing the external grinding wheel, an automativ wheel guard type truing device is included. This device operates under push button control.

For grinding of such internal surfaces as may be necessary, or for grinding those surfaces that cannot be reached with the external grinding wheel, an automatic wheel guard type mounted on the front of the wheel head, is available. Spindles are available to take grinding wheels from ⅞-in. to seven-in. diam, and the unit can be positioned along its dovetail slide for grinding, or retracted to permit the external grinding wheel to be used. *Norton Co.*

Circle E-9 on page 65 for more data

Stock Divider for Checking High Point on Gears

In setting up a gear preparatory to grinding, it is necessary to know precisely the amount of eccentricity and to locate the high point on the pitch circle. Then it can be properly clamped on its arbor so that an equal amount of stock on each side of the high point will be presented to the grinding wheel.

For this purpose, a Red Ring Stock Divider has been developed and put on the market.

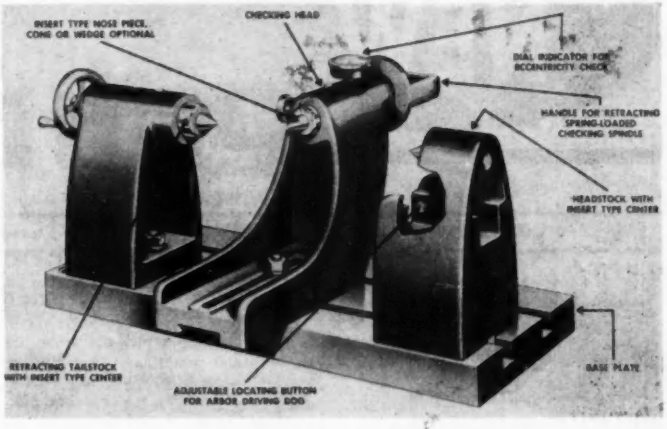
The Stock Divider, usually located on a bench in the vicinity of the grinder, consists of movable head and tailstocks and a checking head adjustable to work gear diameter. This latter part has a removable nose piece and a spring-loaded spindle which actuates a dial indicator for reading gear eccentricity. This spindle may be locked with the nose piece either in or out of contact with the work gear teeth.

The arbor carrying the work gear is set between the Stock Divider centers and the arbor driving dog in contact with the adjustable locating button. In most cases the work gear rotating on its arbor is then checked for eccentricity at several points around its circumference by means of the nose piece and dial indicator.

When the high point is found and positioned in relation to the driving dog, with the nose piece still in mesh, the gear is then locked on the arbor.

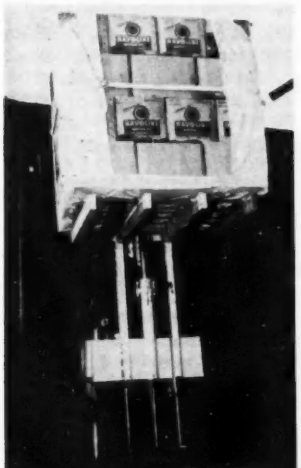
The Stock Divider may also be used for checking eccentricity and tooth size of finished gears. *National Broach & Machine Co.*

Circle E-10 on page 65 for more data


INSERT TYPE NOSE PIECE, CONE OR WEDGE OPTIONAL
CHECKING HEAD
DIAL INDICATOR FOR ECCENTRICITY CHECK
HANDLE FOR RETRACTING SPRING-LOADED CHECKING SPINDLE
HEADSTOCK WITH INSERT TYPE CENTER
RETRACTING TAILSTOCK WITH INSERT TYPE CENTER
ADJUSTABLE LOCATING BUTTON FOR ARBOR DRIVING DOG
BASE PLATE

Red Ring Stock Divider for gears.

Pallet Binder



For securing loads to pallets a special pallet binder has been put into production. This binder is made of canvas and will fit any size or type of skid or pallet. Binders can be obtained with or without skids. (Roger L. Toffolon).

Circle E-11 on page 65 for more data

Self-Indexing Bed Turret

A self-indexing bed turret for use on most standard lathes swinging from 9 in. to 12 in. has been announced. The bed turret features a self-indexing mechanism which is linked to automatic stop rods. These limit stroke length and can be set for any requirement up to the full slide working stroke of 5¼ in. Total slide travel is 6 in.

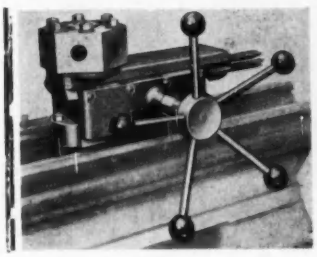
Turret is guided in its rotation by a large diameter pilot integrally cast which engaged a mating bearing in the slide. Flat bearing surfaces between ram and turret are hand-scraped. Due to its design, the entire work load is applied to the pilot and flat bearing surfaces. A hold-down bolt applies an adjustable, pre-loaded pressure against a ball thrust bearing located on the turret base.

Hexagonal turret is provided with flat faces which accommodate flanged tool holders and which may be bored for straight shank tools. Ample turret stock permits boring standard 1 in. holes or even 1¼ in. oversize holes. Long bars can extend completely through the turret.

Indexing is performed by a spring-loaded tapered pin sliding in a sleeve and engaging a mating tapered bushing in the turret. These parts are of hardened tool steel, finish ground.

Other features of the self-indexing bed turret include a calibrated scale showing length of stroke, a tool clearance over ram of 3½ in. on 9 in. and 10 in. lathe models and 4 in. on 11 in. and 12 in. lathe models, and free-wheeling turret action backwards or forwards—if desired. *Globe Heat-Seal, Inc.*

Circle E-12 on page 65 for more data



Globe self-indexing bed turret.

NEW PRODUCTS

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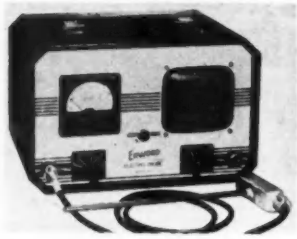


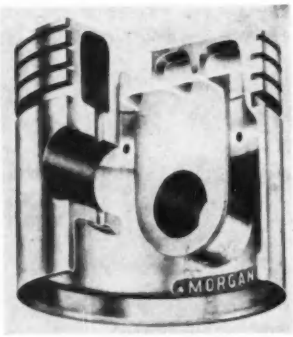
Electronic Trouble Spotter

Incorporating a pick-up probe and three stage amplifier, the Electro-Probe, recently brought out, is an electronic unit sensitive to vibration at point of contact. Speaker and headphones provide audible comparison within a range of 60 decibels; calibrated meter provides visual indication.

When used for testing parts and sub-assemblies, an Electro-Probe reading is first established for an acceptable part or assembly, after which all similar units can be inspected.

Addition of an accessory item permits use of the Electro-Probe as a surface gage. *Erwood, Inc.*

Circle P-5 on page 65 for more data



Solid Skirt Piston for Sports Car Conversion

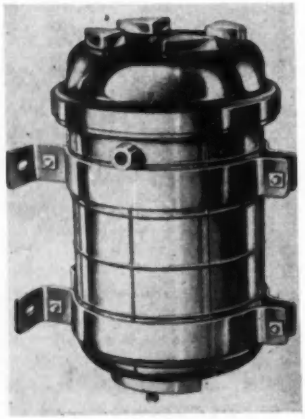
For use in racing and sports car conversions of the Studebaker Champion engine, a light piston has been developed. This piston is made 0.125 in. over stock size, and is designed for the new Indianapolis-tested low friction piston rings.

It features the heat dam which shields the top ring from much of the heat of combustion, and the strut-supported pin bosses which are said to reduce pin flexure to a minimum.

According to the manufacturer this 0.125 in. oversize piston with its light weight chrome plated pin and special rings weighs no more than a stock piston, pin and rings, thus holding reciprocating loads to stock levels.

The manufacturer of this piston states that this piston is the important part of their conversion of the Champion engine which produces 128 hp instead of the stock 85 on regular gasoline. *Frank Morgan Co.*

Circle P-6 on page 65 for more data



Oil Filter and Refiner

A new type oil filter and refiner, called the Oilpure Refiner, has recently been placed upon the market. It is claimed by the maker that the new device will actually refine lubricating oil which is used in an engine. This applies to internal combustion engines of nearly all types including those operating on gasoline, propane, butane, and natural gas, as well as to Diesel engines.

This unique unit is designed to neutralize destructive engine crankcase acids. Another vital function is the removal of dirt, metallic substances, abrasives, and other foreign particles in engine lubricating oil. Prevention of excessive oil dilution is accomplished by the Oilpure Refiner. Finally, it vaporizes any water which may have condensed in the engine lubricating oil.

The Oilpure Refiner is a lifetime unit encased in a reinforced die-cast housing. It is made in capacities of three quarts to 16 gal for automotive use, and up to 75 gal for industrial applications. *Oilpure Refiner Sales Corp.*

Circle P-7 on page 65 for more data

(*Turn to page* 116, *please*)

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

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FREE LITERATURE

Shell Molding Process

Now available is a booklet on phenolic resins for the shell molding process. The literature points out the advantages and fundamentals of this casting process. *Bakelite Co., Div. of Union Carbide and Carbon Corp.*

Circle L-1 on postcard for free copy

Engine Testing Device

Bulletin 9345 discusses the use of the Thrustorg and its application to engine testing. There is an item on measuring the thrust of jet engines and rockets. *Hagan Corp.*

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Mechanical Cleaner

The Aridifier, a mechanical cleaner that is said to remove 92 per cent of oil, moisture and dirt from compressed gas and air lines, is discussed in a recently released bulletin. *Logan Engineering Co.*

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Metal Cleaning

An informative, summarized six-page bulletin on metal cleaning, including concentrations for various cleaning applications and a handy list of cleaners for general industrial use, has been released. *E. F. Houghton & Co.*

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Lathe Case History

Chip Tips No. 21 deals with a case history of a Model X heavy-duty Copymatic lathe used for the contour turning of index worm gear blanks. *Lodge & Shipley Co.*

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Tube Beading

A machine for the beading of bent tubing is illustrated and described in a recently released literature piece. *Gibbons Machine Co.*

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Gear Chucks

Custom built pitch line control gear chucks are described in a booklet which is now available. Typical applications are illustrated. *Garrison Machine Works, Inc.*

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Industrial Sanding

"Better, Faster Finishing for Production and Maintenance Jobs" is the title of bulletin No. 2109, on industrial sanding applications. *Pneumatic Div., Sundstrand Machine Tool Co.*

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Industrial Dust Control

Now being offered is a 28-page bulletin entitled "The Control of Industrial Dust." Case histories of users of dust control equipment are documented with photographs and performance data. *Pangborn Corp.*

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(Please turn page)

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L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
L-6	L-12	L-18	L-24	E-6	E-12	E-18	E-24	P-6	P-12	P-18	P-24	P-30

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Deep Drawing

In the latest issue of Report, Volume Nine, Number One, there is an article on the Hydroforming principle and machines. Another article deals with the use of Cimcool cutting fluid. *Cincinnati Milling Machine Co.*

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Foundry Mechanization

How a foundry can be mechanized for increased production, better castings and improved working conditions is the topic of book No. 2439. It is a selection of actual case histories, foundry layout drawings and installation photographs. *Link-Belt Co.*

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Dynamometer Cooling

Three heat transfer products, used in dynamometer cooling, are described in catalog No. 6051. This piece includes illustrations and specifications for jacket water coolers, Mono-Weld radiators, and heat exchangers together with a typical dynamometer cooling installation diagram. *Young Radiator Co.*

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Gear Quality

A paper which clarifies the data required to specify and test spur and helical gears is offered in "A Practical Approach to Gear Quality." *Eastman Kodak Co.*

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USE THIS POSTCARD

Small Cutting Tools

"Small Cutting Tools of Extreme Precision," an illustrated 18-page catalog, has recently been published. The catalog illustrates and describes a complete line of tools, including carbon-steel taps, prong dies, small reamers, hollow mills and centering tools, small counterborers and step drills. *Woodruff & Stokes Co., Inc.*

Circle L-14 on postcard for free copy

Washers

The X-Washer and X-Washer pin fastener assemblies are described and illustrated in a recently released pamphlet. *Standard Locknut and Lockwasher, Inc.*

Circle L-15 on postcard for free copy

Welding of Mild Steels

A new manual describes the procedure for welding mild and low alloy steels and gives complete information about the electrodes available for such welding. *McKay Co.*

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Nickel Plating

Practical Nickel Plating is the title of a 44-page general publication with over 40 illustrations, tables and charts. It provides the designer, specifying engineer and user with basic information on electroplating and detailed information on nickel plating and its practices. Information on the mechanical properties of deposits, plating conditions and commonly used solutions will be found. *International Nickel Co., Inc.*

Circle L-17 on postcard for free copy

Grinding

Volume 16, Number 2 of the Gardner Grinder contains two articles on clutch facing and brake lining grinding. *Gardner Machine Co.*

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Automotive Thermostats

An illustrated bulletin describing Flexon automotive thermostats has just been released. The bulletin contains detailed application data for all makes and models of passenger cars, including 1952 designs. Also covered are Flexon applications in trucks, tractors, and engines. *Flexonic Corp.*

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Vises and Positioners

A graphically illustrated catalog recently published covers a broad line of vises, including machinists' bench vises. Eight pages are also devoted to Powrarm Positioners, a tool for positioning production line work *Wilton Tool Mfg. Co.*

Circle L-20 on postcard for free copy.

Vital Vehicles

A reprint of an article "Motor Vehicles are Vital to America's Defense Economy" has been made available. *Automotive Industries.*

Circle L-21 on postcard for free copy.

Atomic Energy

There is a limited supply of reprints concerning the use of isotopes by American industry. *Automotive Industries.*

Circle L-22 on postcard for free copy.

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L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
L-6	L-12	L-18	L-24	E-6	E-12	E-18	E-24	P-6	P-12	P-18	P-24	P-30

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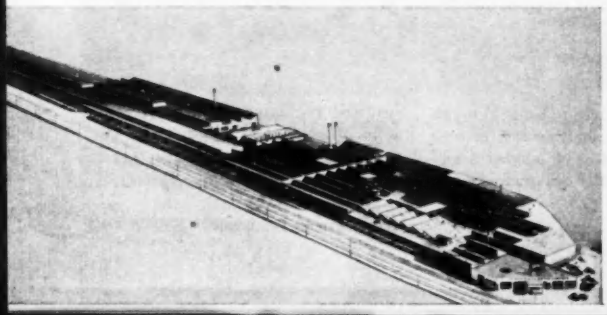
Why is this of interest to you? Because it so clearly demonstrates the superiority of Schwitzer-Cummins products and our ability to serve satisfactorily an ever-increasing number of automotive customers, large and small, newcomers and old-timers. So why not you?



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NEW AIRCRAFT PRODUCTS

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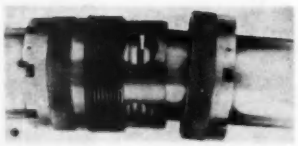
Flexible Coupling for Fuel and Oil Lines

A flexible coupling that withstands pressures in excess of 375 psi and temperatures from —65 to 460 F on fuel and oil lines has gone into production.

The coupling may be misaligned as much as three deg without leaking and tube ends may be separated as much as ½ in. without affecting sealing, according to the maker. End load is absorbed with a metallic retainer. Standard AF 934 "O" rings are used. *E. B. Wiggins Oil Tool Co., Inc.*



Wiggins flexible coupling.

Circle P-1 on page 65 for more data

Water Cooled Environment-Free Alternator

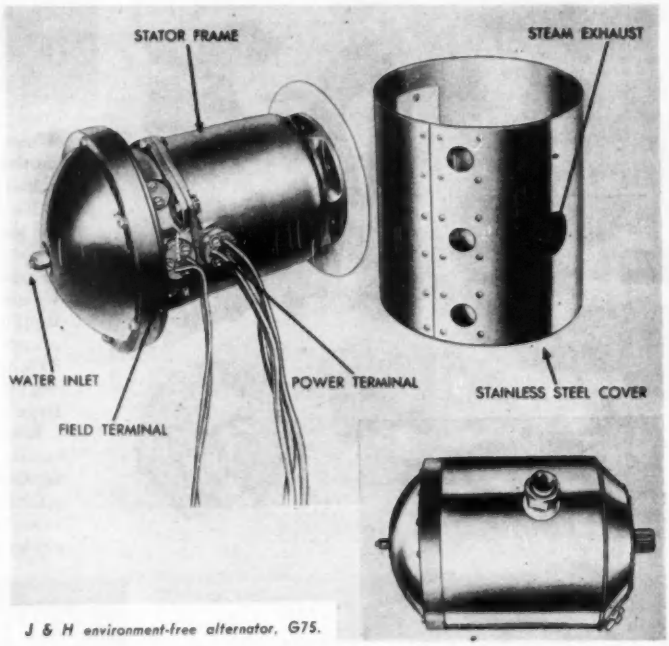
An environment - free alternator cooled by water vaporization has been recently developed. The G75 alternator, said to be the first successful vaporization-cooled environment-free alternator in the industry, maintains satisfactory cooling while operating in extreme conditions of temperature and altitude.

The alternator, 93 per cent efficient, requires 3½ lb of water an hour at rated load. However, its operation is limited to a cycle which depends on the capacity of the coolant reservoir. Size of the reservoir is, of course, limited by weight and space available in the aircraft.

In operation, coolant from the reservoir is injected into the alternator's hollow shaft under pressure. Centrifugal force propels the water through four ports in spray form, and scatters it on the internal surfaces of the machine. As it picks up heat from these surfaces, the water vaporizes to become the coolant. Resultant steam is exhausted through a port. Water inlet flow is regulated automatically by a special J&H valve which is controlled by a temperature-sensing element in the alternator.

The three phase, 400 cycle, 12,000 rpm unit is rated at 12 kva but can deliver 16 kva and maintain satisfactory cooling.

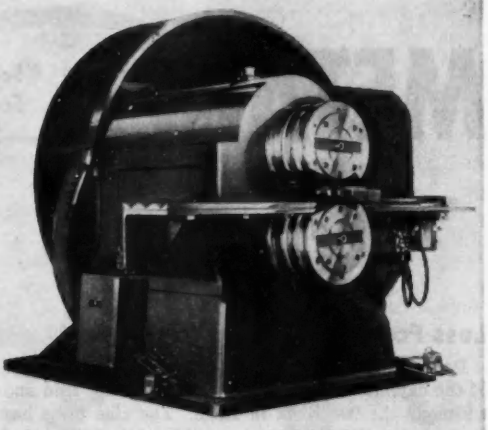
Field power for the machine is taken from the output leads through slip rings and brushes, passed through the rectifier bank and magnetic amplifier of a specially-designed exciter-voltage regulator, and then to the field. *Jack & Heintz, Inc.*



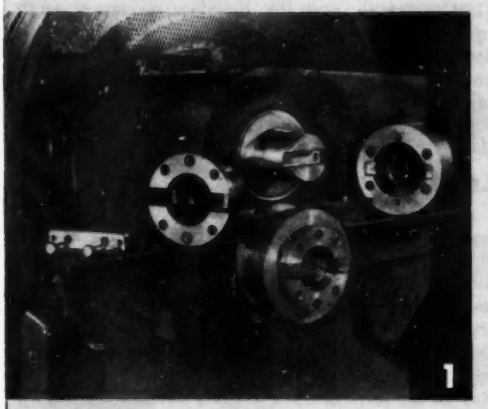
J & H environment-free alternator, G75.

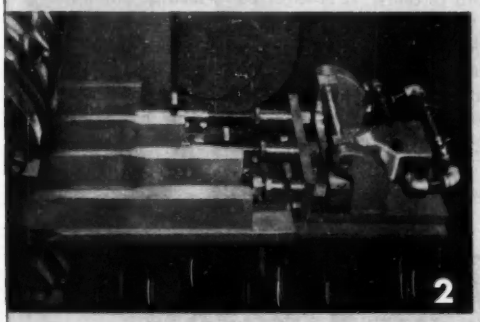
Circle P-2 on page 65 for more data
(*Turn to page* 130, *please*)

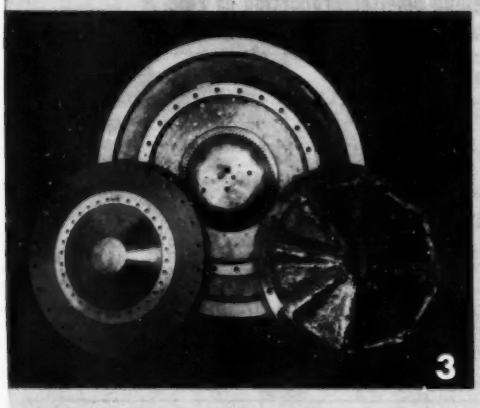
REDUCEROLL your forging blanks!



THE NATIONAL REDUCEROLL • BUILT IN SIX SIZES







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Built into National REDUCEROLLS is the ability to produce greater reductions in area than those previously accomplished by rolling. Machine features include:

* ROLL ASSEMBLY (photo No. 1) Ingenious mounting arrangement assures a tight operating fit and quick roll change.

* AUTOMATIC STOCK GAUGE TRIP UNIT (photo No. 2) sets rolls in motion at the instant stock is in place against gauge. Eliminates use of foot treadle, speeds operation, reduces fatigue.

** DIAPHRAGM CLUTCH (photo No. 3) is air-cooled and operates with only a single friction plate. This is the same rugged clutch which is compiling unparalleled performance records on the latest National Forging Machines and MAXIPRESSES.

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*Patents Applied for **Patented

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METALS

Some Metal Prices Continue Downward Trend. Copper Scarcity Again Intensified by Recent Developments

By William F. Boericke

Less Foreign Demand for Metals

Deflation of metal prices appears to be the order of the day. Actual price reduction began for lead and antimony the last week in April. The zinc price has been shaky at 19½ cents per lb and had the steel shutdown continued, a price cut probably would have ensued. Foreign copper dropped nominally to 35 cents per lb with sentiment highly unsettled. The official price of silver was cut a cent an ounce early in May. Cadmium of foreign origin is being offered at lower prices. Mercury is off several dollars a flask. Tungsten concentrates can be had almost $10 below the ceiling price of $65 per short ton unit. Manganese ore is in easier supply and concessions are offered by foreign producers. The price of cast iron scrap continues to drop and the widely advertised general shortage of a few months ago is over.

The sharply curtailed foreign demand for metals appears to have been primarily responsible for the price declines. Dollars have been harder to get and South American, Mexican, and African producers want hard currencies rather than sterling. In the United States contributory factors have been realization that defense spending may taper off, with less need for metals for military requirements, that capital investment for plant expansion may be curtailed as a result of the Government seizure of the steel plants, and that metal inventories in the hands of consumers are probably larger than suspected because of scare buying last year.

Exceptions to the lower trend in metal prices are nickel and cobalt, which still are in critically short supply. Tin appears to be well stabilized at $1.21½ per lb, and the Bolivian revolution might cause a real pinch in supplies. Any reduction in the domestic price of 24½ cents per lb for copper appears unthinkable for a long time to come. There is no talk of a cut in the aluminum price below 19 cents although production is increasing impressively.

Lead Price Breaks

Lead again won the dubious distinction of being the first of the major metals to interrupt the long advance in prices that started with the outbreak of the Korean war. On April 29 the price was cut 1 cent per lb below the 19-cent ceiling. Running true to precedent it brought no business. Buyers expected a further cut and they were not disappointed. Three days later the leading smelter dropped the price another cent. On May 12 the price dropped abrupty another 2 cents per lb to 15 cents. It is expected to hold at this level.

The halt in Government lead buying for the stockpile contributed to market unsettlement as it was realized that 100,000 tons was all that could be taken without further appropriation. Foreign lead producers hastened to rush shipments to this country to get under the wire before the old tariff of 1 1/16 cents

(Turn to page 90, please)

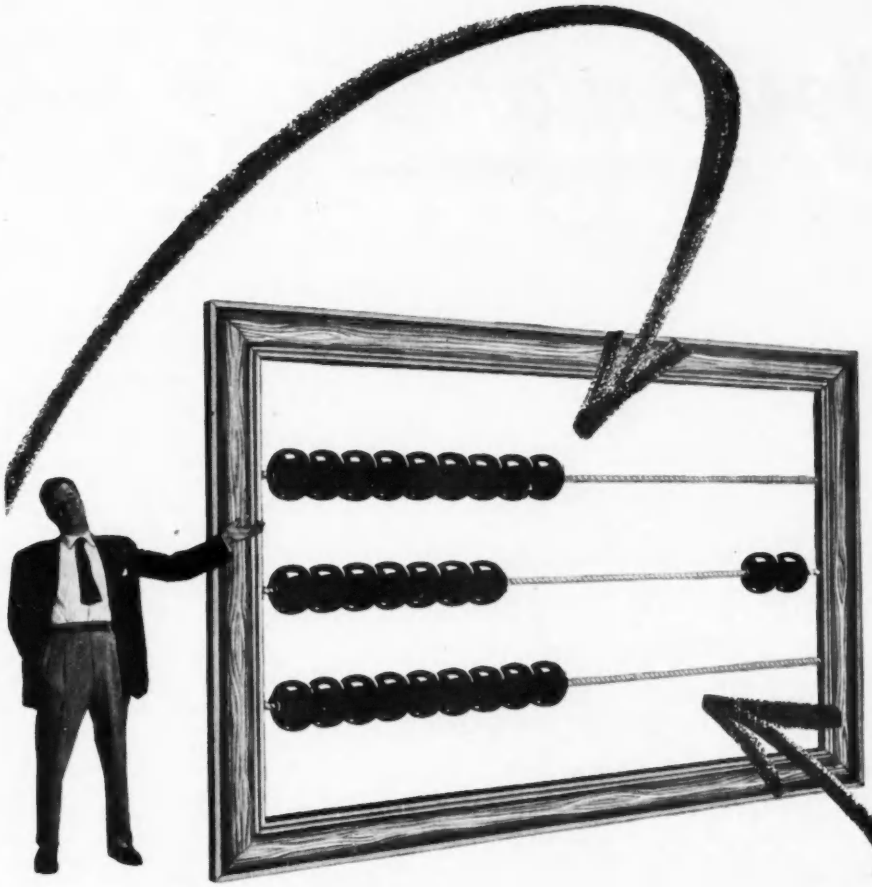
World Mine and Smelter Production of Zinc

All Figures in Thousands of Short Tons

	1949		1950		1951		1952 Est.	
	M	S	M	S	M	S	M	S
United States	593	815	618	848	679	886	700	930
Other North America	470	264	501	258	566	269	670	300
South America	111	4	117	4	156	9	200	22
Europe	274	554	300	654	318	705	360	718
Africa	142	26	182	25	200	23	220	25
Australia	169	91	186	95	193	90	198	90
Asia	49	35	54	59	67	65	70	66
TOTAL	1808	1789	1958	1943	2179	2047	2418	2151
PLUS*	....	103	....	149	....	140	....	151
Adjusted Totals	1808	1892	1958	2092	2179	2187	2418	2302

* Zinc content of zinc oxide, lithopone, zinc coatings and zinc sulphate produced from ores and concentrates.

NOTE: Mine production is on a recoverable basis. Smelter production excludes secondary zinc wherever possible.



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Observations

By Joseph Geschelin

Automatic Loading

We learn confidentially that Seneca Falls has developed an intriguing type of automatic loading device for Lo-swing lathes, designed for loading and unloading long parts such as axle shafts. The loading attachment performs its job in much the same way as does the operator, thereby making it feasible to load and unload long shafts without interfering with the tooling. As we understand it, the loader will be made available only for new Lo-swing lathes and may not be on the market until Government controls are lifted.

5.7 Motors Average

An interesting bit of information was dropped at the recent meeting of the NMTBA in Chicago. The question is—how many motors are there on a machine tool It seems that except where a machine tool may have only one motor, it will be fitted with 5.7 motors as an average.

Standard Wheels

Another item of interest at the NMTBA meeting was to the effect that General Motors has embarked on a program for standardizing grinding wheel sizes. By reducing the variety of wheels to a practical minimum, the problem of simplification and inventories will be under better control. In addition, this should be effective in promoting better shop practice with less work for purchasing departments and the suppliers.

Electrical Standards

Here is a curious thing that was brought out at the recent NMTBA meeting. It seems that in Los Angeles the city officials have decided that the building code is applicable to the electrical equipment of machine tools, and city inspectors presumably are demanding conformity to the code regardless of the difference between a machine tool and a public building. Negotiations are under way to clear up the situation but meanwhile it poses a serious problem both to the machine tool builder and the user.

Rubber Shortage Foreseen

Unless Facilities Are Expanded

Although there is currently an ample supply of rubber, P. W. Litchfield, board chairman of The Goodyear Tire & Rubber Co., has issued a statement warning against a shortage soon to come and urged that a program to meet this situation be mapped out at once.

He recommended expansion of the nation's synthetic rubber industry, creation of a synthetic rubber stockpile of 200,000 tons and additional plantings of natural rubber in the Western Hemisphere, to yield 150,000 more tons annually, as steps in that direction.

"We should begin now to lay out a national program of synthetic rubber expansion," Mr. Litcheld said. "It should be developed in such manner as to assure the presence of additional capacity in advance of the actual need. Existing plants should be made ready while there is still time for orderly thinking. This preventive approach to the problem of growing demand will spare us the ordeal of more drastic remedies later on."

Present synthetic plants can be modernized to provide capacity for the reserve stockpile and this program can be put into effect quickly as a cushion against the time when rubber demand exceeds supply, he said.

The Goodyear board chairman pointed out that natural rubber is a highly volatile commodity which over the years has witnessed an almost incessant game of leap frog between supply and price.

These violent fluctuations, he emphasized, strike hard at the American pocketbook while our national attitude toward rubber veers sharply between complacency and near panic.

Today's improved rubber outlook, it was pointed out, follows close on the heels of the drastic shortage which began shortly after Korea and continued through 1951, with natural rubber prices soaring from a low of 18 cents per lb to a high of 84 cents at the peak.

"This pinch," said Mr. Litchfield, "cost American consumers millions and millions of dollars as well as great inconvenience; and a substantial part of this could be charged to our own failure properly to utilize our national facilities for the production of synthetic rubber.

"If the current easing up period induces a recurrence of our habitual weakness for procrastination and indecision in matters of national rubber policy, then we are due for another rude awakening. And, this time, I mean very, very rude."

Current available supply of rubber to meet world needs, he said, is 2,750,000 long tons annually. It is made up of 1,000,000 tons of synthetic capacity and 1,750,000 tons from existing stands of natural rubber trees.

World requirements for 1952 will be approximately 2,335,000 long tons, thus leaving a statistical surplus of around 415,000 tons.

"But," warned Mr. Litchfield, "judged by historic trends and forces now in evidence, total requirements are going to continue to climb. By 1955, world requirements of new rubber may be 150,000 tons in excess of today's total capacity. By 1960, it is accepted in informed circles, that world requirements will be not less than 400,000 long tons and possibly as much as 1,500,000 long tons in excess of our present potential capacity. So the next big squeeze is not too far around the corner.

"Even with increased planting of natural rubber, this source alone cannot meet our growing needs," said Mr. Litchfield, "and we can look only to synthetic rubber production for the major part of the answer."

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Piasecki Builds Two Versions of YH-21 Helicopter

DETAILS of the YH-21 Work Horse largest and most versatile helicopter built for the U. S. military services, were disclosed early this month by the Piasecki Helicopter Corp.

Capable of operating with an overload gross weight of more than 14,000 lb, the YH-21 has substantially greater load-carrying capacity than any other helicopter now in use by the Army, Navy or Air Force.

Piasecki will build both rescue and transport versions of the helicopter. The YH-21 and H-21A are rescue helicopters for the U. S. Air Force's Air Rescue Service, part of the Military Air Transport Service. Two transport versions, the H-21B assault helicopter for the USAF and the H-21C, an Army troop carrier and resupply version, will be produced at the company's factory in Morton, Pa.

All versions of the Work Horse will be powered by Wright Cyclone 9 engines. In the rescue helicopters they will be limited to 1150 hp. For transport aircraft, the full 1425 hp of which the engine is capable will be utilized, giving additional lift.

The Cyclone 9, also known as the R-1820-103, is the largest engine ever installed in a production model helicopter.

The Work Horse cargo compartment is 20 ft long. All-metal floors contain skid rails to facilitate cargo positioning and tie-down fittings are built into the floors for securing packages, troop seats and litters.

Brackets are provided for installing 12 litters in the rescue version. When installed, the litters are arranged in four tiers, three litters high, with two tiers along each side of the cabin. An aisle between litters in the center of the cabin contains adequate clearance for movement of attendants and loading and unloading of litters. Pressed into use as a transport, the rescue version can carry 14 men.

Twenty troop seats will be installed in the H-21B and C for transport operations. Nine seats are located along each side of the cabin and two are positioned laterally at the rear of the cabin. There is a 22-in. aisle between the seats through the center of the cabin. When not in use the seats can be collapsed and folded against the sides of the cargo compartment, making available the entire space for loading supplies and equipment.

The cargo compartment has two loading doors. A large rectangular door is on the left side of the fuselage near the aft end of the cargo compartment. A slightly smaller door, practically square at the bottom and oval at the top, is on the right side of the fuselage at the forward end of the compartment.

Provisions are included for installing a hoist above, and on the outside of, the forward cargo compartment door. This is a hydraulically operated, swiveling boom type hoist capable of lifting 400 lb. While the hoist is designed primarily for taking aboard litter patients, stranded personnel and crash victims, it can be used for loading or unloading cargo when conditions make it impossible to land the helicopter.

The tandem design of the H-21 helicopter permits the use of all types of Army trucks for loading and unloading supplies through the compartment doors. Cargo can be directly loaded from a four ton truck at the rear door and from a one and one-half ton truck at the forward door. The rotor blade clearance is adequate for trucks at both doors. With blades in the static drooped position trucks can be backed up to the doors without passing beneath the blades and blade folding or dephasing is unnecessary.

When rapid loading and unloading is required and rotors must be kept turning in readiness for a fast take-off, the blades will clear the tops of most cargo trucks.

An advantage of the H-21's tandem configuration is the generous center of gravity range. The center of gravity of the helicopter can move 53 in. longitudinally without disturbing the craft's flight control characteristics. This eases the job of placement of cargo and much of the time and effort normally used in loading rotary-wing aircraft is saved.

Behind this loading feature of the Work Horse lies the ability to control the lift of the two rotors, one at each end of the helicopter. If the helicopter were perfectly balanced its center of gravity would be exactly on the center line between the two rotors, and each rotor would lift exactly one-half of the gross weight. However, such balancing is not necessary in the H-21 because the collective pitch of both rotors is automatically controlled, differentially, through the pilot's cyclic pitch control to increase the lift of the rotor as necessary to balance the helicopter's load.

With this control at the pilot's disposal, cargo can be placed and secured with greater flexibility, packages can be safely shifted and personnel can move about with relative freedom during flight—all of which means greater versatility for the helicopter in logistical operations.

One of the advantages of the H-21 is its ability to transport, externally, equipment that is too large for loading into the cargo compartment. Provisions are included in the fuselage for installation of an external cargo sling. The sling features a quick release mechanism, operable from either the cockpit or cargo compartment.

Boeing Bomber Range Upped by Wing Fuel Tanks

Normal combat range of the new B-47B Stratojet has been reportedly increased considerably over earlier B-47's. Two external fuel tanks, the capacity of which was not announced, now may be used on all production B-47's.

The bomber is in large-scale production at the Wichita Div. of Boeing Airplane Co. It also is to be produced by Douglas Aircraft Co., Inc., and Lockheed Aircraft Corp.

The streamlined fuel tanks, said to be the largest ever mounted on an airplane, will be utilized on long-range missions. They are suspended one under each wing, between the tip and inboard jet engine pods. The fuel tanks are being built to Boeing specifications by Ryan Aeronautical Corp.

Republic Jet Backlog Reaches $800 Million

According to a recent report, Republic Aviation Corp.'s orders are now at the largest volume since World War II with a backlog in excess of $800 million.. The versatility of the F-84 Thunderjet fighter-bomber was credited with having been responsible for the demand.

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Latin American Automotive Market

(*Continued from page* 38)

trucks under French and British direction. If these projects are as successful as the present Italian arrangement, the Brazilian picture will be greatly changed in the next decade.

Among the major American assembly plants in Brazil, both Ford and G.M. are currently producing near capacity. Import controls on passenger cars, however, are limiting their production to 40 per cent of the total, as compared to a normal proportion of 60 per cent cars and 40 per cent trucks.

Potential in Argentina

Argentina is one of the greatest potential automotive markets in South America, yet its import controls have been perhaps the most stringent and erratic since the war. Buenos Aires, for example, has two of the finest assembly plants in South America. During the government's buying spree of 1947, these plants were turning out cars and trucks at the rate of 2000 units per month. In the last three years, however, operations virtually ceased because of suddenly imposed trade restrictions.

Total imports, governed largely by the international buying activities of the Argentine Trade Promotion Institute (I.A.P.I.) have followed a unique pattern as shown below:

Year	Cars	Trucks
Pre-war average	14,000	4,500
1946	9,089	7,686
1947	35,000	50,000
1948	5,500	9,400
1949	1,800	1,600
1950	790	560
1951	18,500	5,000

Of these totals, U. S. sales since the war have varied from 30-65 per cent of the passenger cars and from 75-95 per cent of the trucks.

Argentina has in use approximately 225,000 cars, 128,000 trucks, 11,000 buses and 18,000 motorcycles, although figures vary with the source of information. A large percentage of these vehicles are 15 years or older, and many undoubtedly are inoperative for lack of parts. Actually, vehicles in use have steadily declined since the war except for short periods during 1947 and 1951 when imports exceeded the number taken out of service.

The increase in Argentine buying which was noted last year is expected to continue during 1952. A recent decree by the Central Bank now permits an Argentine buyer to use any funds he may hold outside the country to pay for his foreign purchases. Until now, an importer had to obtain a special license from the Bank which allowed him to purchase foreign exchange with pesos—usually at a very high exchange rate. Only fleet operators, parts dealers, manufacturers and regular import houses are included in this ruling to date, and their purchases still must be limited to their normal business requirements.

Import controls on replacement parts were also relaxed somewhat in 1951, but increased purchases abroad have failed to satisfy the enormous demand built up in recent years. Spark plug imports from the U. S., as one example, jumped to 1,341,000 last year from a post-war low of 69,000 in 1949. During the same period, total value of replacement parts purchased from the U. S. in-

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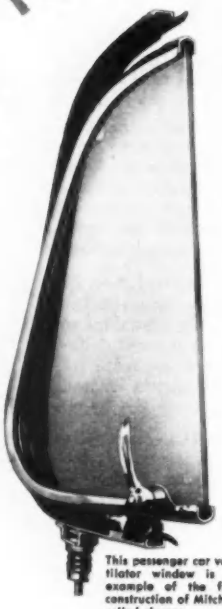

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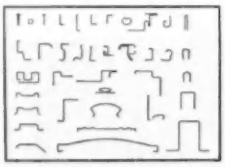

A few of the many rolled shapes fabricated by Mitchell.

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UNITED AIR CLEANER DIVISION • CHICAGO 28

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Latin American Market

(*Continued from page 76*)

creased 485 per cent. Local manufacturing of parts, of course, is on a very small scale and has virtually no effect on the market.

Raw material shortages have continued to plague Argentina's five tire factories, with yearly production limited to about 850,000 sets of tires and tubes. While tires continue to be rationed, imports are limited to special sizes only. During last year, a few tires were purchased from Brazil.

Fuel shortages are also limiting motor vehicle use in Argentina. Crude oil production is less than 25 million barrels per year, and considerable quantities of gasoline, Diesel fuel and lubricants have to be imported. Two new catalytic cracking plants were opened by the government recently and some improvement in the fuel situation is expected. Purchases of service station equipment are expected to increase this year as a result.

Some idea of the potential automotive market in Argentina can be gained from the fact that nearly 200 million tons of freight care carried each year by motor transport, compared to 55 million tons by the railroads. Some 500 trucking companies are registered, half of these operating five or more vehicles each. About six per cent of Argentinas commercial vehicles are truck-trailer combinations.

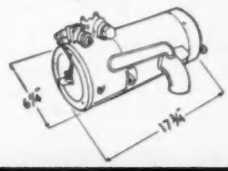
Steady Gains in Venezuela

Because of oil-derived income, Venezuela continues to rank among our major automotive export markets. Since 1947, yearly sales have consistently averaged about $20 million each for cars and trucks with an additional $9 million for replacement parts and accessories. Imports of batteries, spark plugs and other electrical equipment are valued at over $2 million annually, while purchases of tires account for another $2 million each year. Increased tariffs to protect the local rubber industry, however, will gradually reduce this last figure.

Registrations are estimated at 72,000 cars, 55,000 trucks, 3800 buses and 2000 motorcycles. Many of these are post-war models as poor roads and indifferent maintenance have reduced average vehicle life to five years or less. Improvement and extension of roads, however, has been

Never before in engine pre-heating

such power, compactness and adaptability to designs!



New South Wind Pre-Heater makes quick engine starting possible

Now—at long last—South Wind and South Wind Engineers have developed an engine pre-heater that surpasses all previous designs and concepts... ushers in a new era in pre-heating power, efficiency and performance!

Here at last is compactness—compactness you'll scarcely believe! An engine pre-heater scarcely larger than a standard battery (see dimensions above). Small in size, surprisingly light in weight, with an amazing capacity of 65,000 B.T.U.

Here is adaptability—true adaptability to *all* designs. A pre-heater equally effective on either liquid or air cooled engines. A unit that can be used automatically or manually. And can be used directly, indirectly for transferring heat through coolant and cold engine walls, or any way you choose to suit your designs.

Here, too—and at your disposal always—is an experienced staff of South Wind Field Engineers. Available to assist you with your specific pre-heating or heating problems. Write today for their help in adapting this or any other model in the complete South Wind line of heaters for commercial, military or civilian aircraft. South Wind Division, Stewart-Warner Corporation, Indianapolis 7, Indiana.

Check these exclusive advantages!
Only South Wind offers them all
in so compact a system of engine pre-heating

1. Quick, easier starting at —65°F.
2. Conforms to latest military requirements.
3. Adequate lubrication at all times.
4. Lower maintenance cost.
5. Longer engine life.
6. No interrupted service.
7. Resistance to cranking power minimized.
8. Clean air alone is used to raise temperature of induction air.

A PRODUCT OF SW STEWART WARNER

South Wind

AIRCRAFT HEATING
AND THERMAL
ANTI-ICING EQUIPMENT
INERT GAS GENERATORS

Latin American Market

(*Continued from page 78*)

granted top priority according to a plan announced recently by the Ministry of Public Works.

The size and number of trucking fleets has steadily expanded in Venezuela, and it is estimated that 150 companies have ten or more units in service. Few Diesel trucks are operated because gasoline is so cheap.

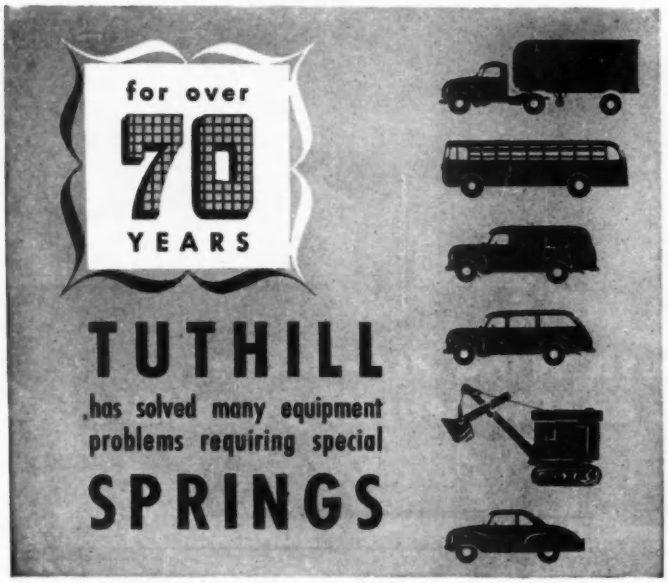
Assembly plant operations have grown quite rapidly since the war, due to a tariff differential on unassembled vehicles. The General Motors plant, erected in 1948, has limited its production exclusively to trucks, although facilities are being expanded for passenger car assembly.

Because private car ownership is so limited in Latin America, trucks and buses account for a surprisingly large proportion of these totals. It should also be noted that most vehicles now registered as buses were originally imported as truck chassis and were then equipped with locally built bus bodies. Moreover, it has been estimated that one-fourth of the passenger cars imported eventually are used for taxi or "micro-omnibus" service that South Americans favor. Because of the importance of commercial motor traffic in all countries, restrictions on truck imports were the first to be eased during last year. Truck sales in Peru, for example, are currently 63 per cent of the total while in Uruguay they account for 55 per cent of the total.

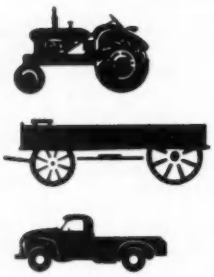
Motor vehicle maintenance except in larger cities is primitive by U. S. standards, and modern engine tune-up equipment only recently has come into general use in such countries as Cuba, Uruguay, Peru and Chile. The demand for wheel-balancing and alignment equipment, reboring tools, hydraulic hoists, grease guns and other common shop equipment is increasing steadily. However, such sales are limited by extreme shortages of trained mechanics. U. S. firms enjoy nine-tenths of the automotive tool business, and shop training programs sponsored by many American companies are helping them maintain this position.

Fuel supplies are adequate in all areas, with local refineries furnishing most of the requirements in the larger South American countries. U. S. petroleum products are exported to the West Indies and Central America, however, with Cuban purchases alone averaging $37 to $40 million per year. In Cuba, Haiti and the Dominican Republic, alcohol-blended fuel offers important protection to the local sugar industry, and this "combustible" is required by the government to be used in all cars and trucks. Because of the widespread use of both alcohol and low grade gasolines, local distributors and assembly plants are finding it increasingly important to change factory-recommended carburetor settings and ignition timing.

Road building continues at a rapid pace in practically every country and new all-weather roads now are reaching into agricultural districts that were isolated before the war. Most of the gaps in the Pan American highway were closed in 1950 and 1951, and international truck transport has more than doubled its tonnage in the last five years. As it has in this country, the automobile is creating thousands of new jobs and helping to raise living standards in all countries south of the border.



Since 1880 Tuthill has specialized in designing springs to fit every specific need. Whether your spring requirements are for trucks, buses, automobiles, power shovels, farm wagons or dual and triple axle heavy-duty jobs—Tuthill can meet them quickly and economically. And now, MOLYBDENUM DISULPHIDE (MoS_2)... the newest Tuthill extra that keeps springs from *squeaking* and *galling*, is an added Tuthill feature that distinguishes this famous line.



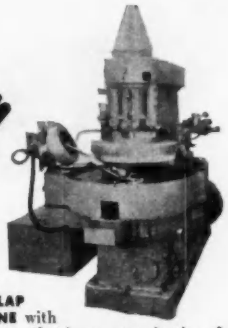
Whatever your spring requirements may be — see Tuthill first!

TUTHILL SPRING CO.

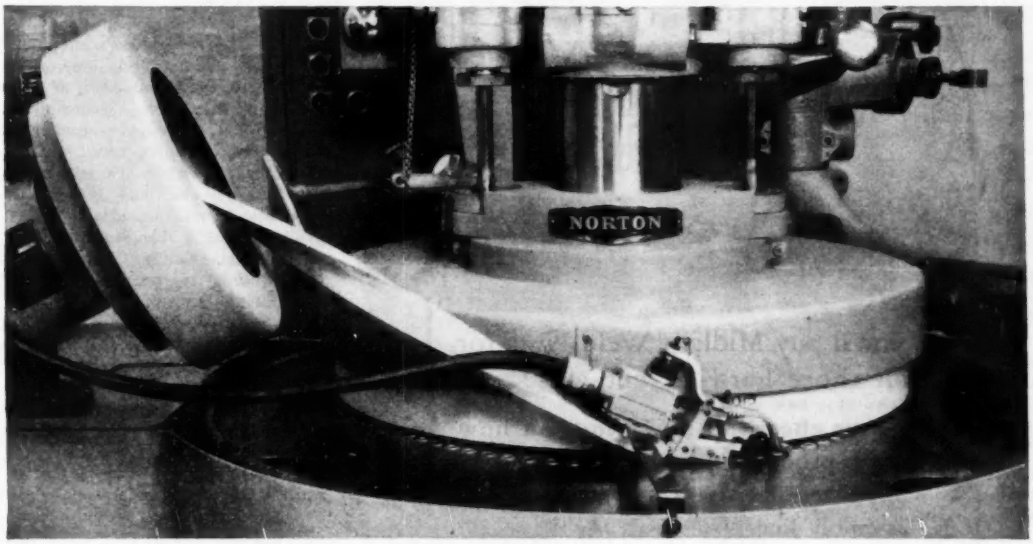
760 W. POLK ST.,
CHICAGO 7, ILLINOIS

Norton Thru-Feed Lapper

cuts costs of lapping small, flat parts



NORTON 26 HYPROLAP LAPPING MACHINE with automatic loading features that increase production of small, flat parts difficult to handle manually as much as 4 to 1 . . . as many as 8000 pcs/hr.



AUTOMATIC LOADING ARRANGEMENT of Norton 26 Hyprolap lapping machine makes sure parts are in correct position before entering feeding trough . . . prevents ganging up . . . directs work in a path that assures even lap wear.

NEW built-in automatic loading adds extra advantages to Norton 26 Hyprolap*

Do you want to make 4-to-1 savings in lapping small, flat parts? You *can* . . . as many firms report . . . with new Norton 26 Hyprolap lapping machines with the exclusive built-in thru-feed mechanism.

Here's why:

1. You speed up production. Loading and lapping operations handle parts as fast as 8,000 pieces per hour.

2. You cut handling. Loading and unloading are completely automatic.

3. You reduce downtime. Work path traverses the entire working surface of each lap . . . promoting even wear . . . reducing the frequency of lap dressing.

4. You cut out operations. This lapper removes stock down to .0002" tolerances . . . makes surfaces parallel to .000025" . . . in many instances without pre-grinding of parts.

5. You use less skilled help. Filling feed hoppers and removing finished-work baskets are the only manual operations.

No wonder 4-to-1 savings are a matter of record with the new Norton Hyprolap with built-in automatic loading!

Send for Bulletin 852-7. Also submit samples of your work for production estimates. Standard hopper-feed Hyprolap machines take work up to 1¼" diameter. Modifications handle larger work. NORTON COMPANY, Machine Division, Worcester 6, Mass.

To Economize Modernize With **NEW**

NORTON

GRINDERS *and* LAPPERS

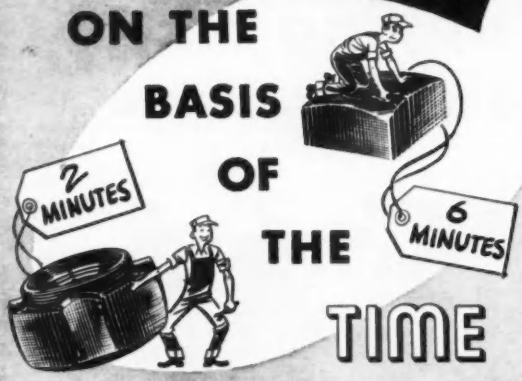
Making better products to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit

*Trade Mark Reg. U. S. Pat. Off.

IF FASTENERS WERE SOLD

ON THE BASIS OF THE TIME



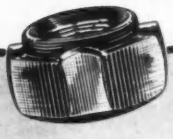
it takes to USE them...

you'd buy Midland Weld Nuts for all those hard-to-get-at places.

Better check up now; find out how much production time you're LOSING because of "blind spots" on your assembly line.

Then, investigate...

MIDLAND



WELD NUT

The MIDLAND STEEL PRODUCTS COMPANY

6660 Mt. Elliott Ave. • Detroit 11, Michigan

Export Department: 38 Pearl St., New York, N. Y.

MANUFACTURERS OF:

AUTOMOBILE AND TRUCK FRAMES | AIR AND VACUUM POWER BRAKES | AIR & ELECTRO-PNEUMATIC DOOR CONTROLS

Vehicle Components Rebuilt by Army

(*Continued from page* 55)

Engines come into this shop in an incredible state of deterioration after years of exposure to the elements and come out looking as if they had just been shipped from the GMC, Willys, or Dodge assembly lines. They are first given a thorough cleaning with steam, hand scraping, and chemicals and then completely disassembled, after which their component parts again are given a thorough chemical cleaning. Both disassembly and assembly lines are on a progressive basis in accordance with American mass manufacturing procedures.

Next step is reconditioning of component parts. Clutch pressure plates are reground, valve seats reground or replaced with inserts, valves are refaced, cylinder walls are rebored to standard oversizes and honed with automatic honing machines, pistons are fitted with a shim and pull gage, and the engine finally is given a thorough washing to remove all machinings. Simultaneously, all other engine components have been passed through progressive repair and reconditioning work stages and are carried by the roller conveyor to the assembly stations. After the engines have been completely reassembled they are given a two-hour test on an American hydro-brake type dynamometer, after which the engine receives a final cleaning before being given a complete paint job.

Cracks up to four in. maximum length in engine blocks are repaired as follows: A small channel is ground the length of the crack, after which it is coated with flux. A thin coating of solder is flowed on next and the channel is then filled with solder, after which it is dressed down with a sander.

A unique method is used to apply preservative oil to the interior of the engine before it is crated for shipment to the combat theatre. Formerly this was done with an air spray gun, but it was found that the moisture in the air caused rusting and ultimate rejection of the engine or failure in the field. This problem was solved by using an old Bosch type Diesel fuel pump with the plumbing so arranged that the injectors screw directly into the spark plug holes. The pump is driven by an electric motor and delivers the preservative oil under pres-

(*Turn to page* 85, *please*)

CLARK

Painstaking research, engineering experience and production skills always show up in the final product—and that's true of Clark front axles. They are known to be thoroughly dependable under trucks, busses and other industrial equipment. It's good business to work with Clark.

Turn and see reverse side for more about CLARK products

CLARK EQUIPMENT COMPANY, Buchanan, Michigan

Other Plants: BATTLE CREEK AND JACKSON, MICHIGAN

No "absenteeism"

WITH CLARK SERVICE AT YOUR "FRONT DOOR"

Machine "Absenteeism" is Machine Down Time, the ugly symbol of lost production and lost money. Clark protects you against this worst-of-all waste in three fundamental ways:

1 **Clark Materials-Handling machines are better built, to begin with—built for long years of usefulness, for easy maintenance and for low-cost operation.**

2 **Clark—and only Clark—provides a complete, nation-wide maintenance and repair service designed to keep your materials-handling machines on the job.**

3 **Clark's reliable service protects your investment in Materials-Handling equipment.**

AND IN ADDITION Clark service is literally at your "front door" 24 hours a day. It is extraordinary service, giving you what you need when you need it. It isn't lick-and-promise service—it isn't just "lip" service—it's "work-or-else" service! And the station at your "front door" is well stocked with genuine Clark parts. Behind it is Factory Service which fills emergency orders in less than 48 hours!

Clark fork-lift trucks, powered hand trucks and industrial towing tractors solve your materials-handling problems. And Clark's unrivalled service keeps 'em rolling. Clark machines and Clark service are an unbeatable team that plays only for your profit!

PRODUCTS OF CLARK—TRANSMISSIONS • FORK TRUCKS AND TRACTORS POWERED HAND TRUCKS • GEARS AND FORGINGS • AXLE HOUSINGS ELECTRIC STEEL CASTINGS • AXLES • TRACTOR UNITS

CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS**

AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • **CLARK EQUIPMENT COMPANY** • BATTLE CREEK, MICHIGAN

Please send me the latest issue of Material Handling News.

Name_____

Firm Name_____

Address_____

City_____ Zone_____ State_____

AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

Vehicle Components Rebuilt by Army

(*Continued from page* 82)

sure but without air to the interior parts of the engine which is simultaneously turned over by another electric motor.

Axle housings with up to one in. deflection are straightened by hydraulic jacks with alignment tested with a special device. It is a special sighting device consisting of four plugs, two of which are screwed on the ends of the housing and two in the axle tube at either side of the carrier inside the banjo. The plugs have a ⅛-in. peep hole drilled through them and a light is hung at one end of the housing. When the operator can see light through all four plugs the axle is in satisfactory alignment. The device is said to save considerable time and money since no dials or other complicated equipment is required.

Another innovation of interest is the means of testing drive axles right on the assembly line through means of a special work stand. The axles to be tested are rolled along the roller conveyor to line up with the test unit and fastened in place with one turnbuckle. The axle is hooked up to the test machine with a quick coupler and the whole gear assembly can be tested for noise and gear clearances in a fraction of the time required if it were taken from the line to a special stand.

An old brake drum lathe is being used in the shops for metallizing. It is used to rotate the piece being plated while the metallizing gun stays in a stationary position. Small honing machines with special spindles also are used for the same purpose, saving considerable space.

Another improvisation is use of three portable boring bars mounted in a fixture for boring cylinders. Three alternate cylinders are rebored and when the cycle is completed a lever-activated mechanism indexes the bars to the other three cylinders.

In addition to metallizing, many other methods are used to bring worn parts back to original tolerances and specifications. Worn hubs on crankshaft vibration dampers are brought back to original size by flash plating with copper and completing the job with a bushing. In cases where the spider pinion shaft wears a larger hole in the differential case, the hole is bored out, tapped, and a threaded bushing is installed and then rebored to standard pin size. When spindles become so worn that bearings are loose, the surface is knurled oversize and ground back to standard dimension. When the guide pin groove in the gear shift lever is worn, the lever first is straightened and then the old slot is filled in with weld. A new groove is milled in on the opposite side of the ball and the lever is then given a reverse bend.

There are, of course, hundreds of other examples of how worn parts are reclaimed through building up with metallizing, chrome plating, use of bushings, and other processes, but they are much too numerous to detail here. It can be said, however, that the entire operation is doing yeoman service in salvaging parts that in a normal State-side operation would be discarded, but which can profitably be restored to give many miles of active service under the particular economic conditions prevailing in Japan.

VULCAN has the special coated fabric DIAPHRAGMS

FOR AUTOMOTIVE AND AIRCRAFT CONTROLS

Wherever component design requires actuating diaphragms or synthetic rubber coated fabrics having special properties, VULCAN has the knowledge and facilities to solve the problem.

Leading equipment manufacturers choose VULCAN diaphragms and fabrics for such applications as

- Fuel Pumps
- Carburetors
- Instrument Diaphragms
- Dashpot Mechanisms
- Vacuum Booster Pumps
- Fuel Metering Controls
- Hydraulic and Pneumatic Control Mechanisms

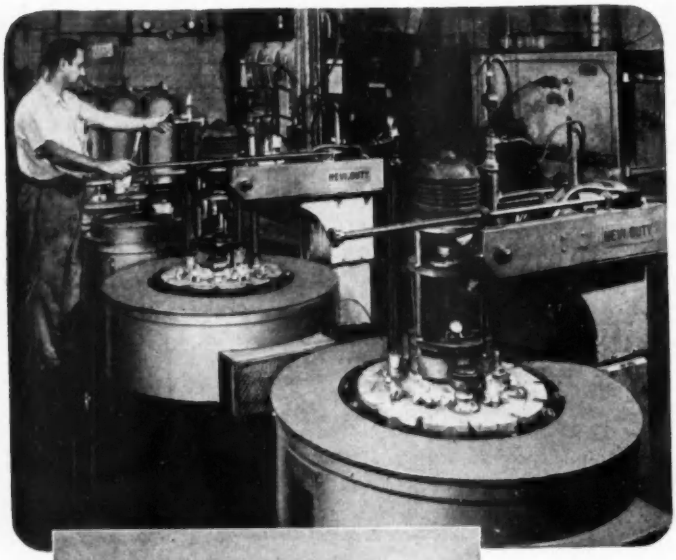
Fabrics available in a wide range of specifications as to base fabric, gauge and properties of coatings. Highly resistant to gasoline, oils, aromatics, alcohols, butane, propane and solvents. High heat and cold resistance.

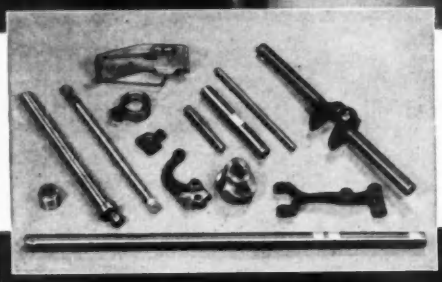
Bring us your problems. Our engineers will work with yours. Write for literature.

VULCAN RUBBER

PRODUCTS, INCORPORATED

58th Street and First Avenue • Brooklyn 20, N. Y.





Typical parts heat treated in Hevi Duty furnaces at the Union Special Machine Co.

UNION SPECIAL
heat treats precision parts in
HEVI DUTY FURNACES

● Over 100 different heat treating operations are represented in one Union Special industrial sewing machine. All the carburizing, dry cyaniding and bright annealing of precision ground shafts, bearings, journals, castings and eccentrics is done in versatile Hevi Duty Vertical Retort Furnaces.

Walter Weinwurm, chief metallurgist at Union Special, says "Our Hevi Duty furnaces do an exceptionally good job of heat treating precision parts. The work comes out of the furnaces clean with no scale or oxidation."

Learn more about Hevi Duty vertical retort furnaces — write for your copy of bulletin HD-646 today.

HEVI DUTY

HEVI DUTY ELECTRIC COMPANY
MILWAUKEE 1, WISCONSIN
Heat Treating Furnaces... Electric Exclusively
Dry Type Transformers *Constant Current Regulators*

Different Cars

(*Continued from page* 47)

located at the point where bodies are received from Fisher Body. Complete specifications for the specific car, tied in with a given body, are transmitted to some 10 sub-assembly stations in 10 plants to control the delivery of parts from supply lines to the final assembly line.

At Studebaker, scheduling is done by the Linesetting Division which provides the plant with information as to the quantity of cars to be built by model and type for a specific day about two weeks in advance. The Order Division then prorates this group of cars among regional areas of the country, sending the information by teletypewriter to regional offices.

The following day each regional office replies by teletypewriter, grouping the cars in loads of four each, with a code showing the model, type, color, transmission, and equipment specified for each car. It also indicates where the cars are to be shipped as well as the dealer's order.

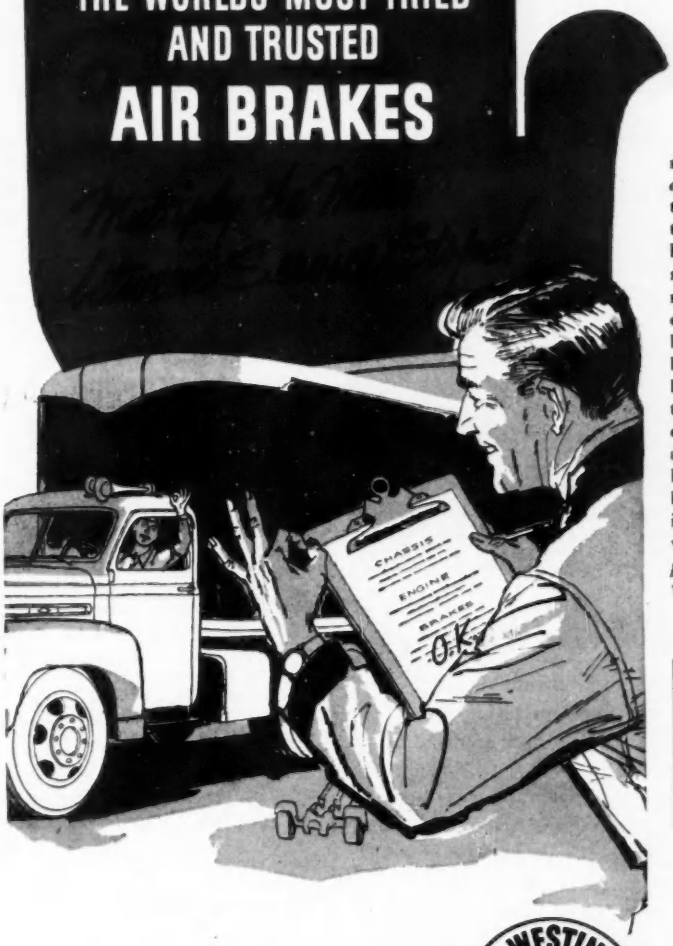
The Order Div. then prepares the production orders in two sets—one for the body department, the other for the final assembly line. These production orders go to the Linesetting Division for controlling the body lines. As each body is completed, the information is transmitted to Linesetting indicating that the body is produced and ready for the final line.

At this point the production orders for the final line are pulled from the linesetting files and final linesetting sheets prepared to show the sequence each car will follow on the final assembly line. Linesetting is handled by means of hectographed sheets dispatched constantly during the day. A teletypewriter installed in this department is employed to provide immediate notification of changes or deletions that may come through while cars are moving along the assembly line.

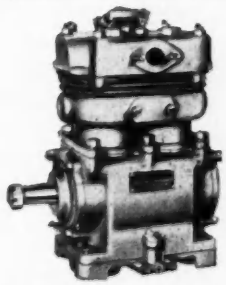
Packard and De Soto also employ teletypewriters for scheduling. Packard has about 70 of these machines throughout the plant to provide for complete control at every critical stage of production.

AUTOMOTIVE INDUSTRIES
Keeps You Informed

THE WORLD'S MOST TRIED AND TRUSTED AIR BRAKES



WHEN YOU SPECIFY BENDIX-WESTINGHOUSE AIR BRAKES for your trucks or buses, you can do so with the complete confidence that comes with making the best choice—*and knowing it!* Your judgment is backed by the fact that no other brake in the field has rolled up such an outstanding record of superiority over billions of miles traveled on *all* kinds of hauling jobs. And, as most truck and bus operators will tell you, this remarkable record goes farther than better braking performance alone. The *real* pay-off to these practical businessmen comes in the cost cutting economy—economy that results from rugged, durable construction and a smooth, constant braking effort that multiplies the miles between service stops and decreases maintenance costs on linings, drums, tires and chassis while actually *increasing* their operating life! That's because these mighty brakes are built to the highest standards by the most experienced manufacturer in the business. Take advantage of it—when you specify Air Brakes, specify the *proven* brakes—Bendix-Westinghouse, the world's most tried and trusted air brakes.



The Bendix-Westinghouse Compressor—heart of the air brake system—performance proven over more miles on more installations than any other compressor available!

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY
ELYRIA, OHIO

BENDIX-WESTINGHOUSE AIR BRAKES
REG. U. S. PAT. OFF.

Plastic Aircraft Development

(*Continued from page* 49)

ing Durestos. In the first, the sheets of plastic are saturated in warm water and rolled by hand over wooden or plaster shapes. They are then cured in an oven at 80 C for eight or nine hours. This extremely simple technique can be used only for small interior components of the wing, such as supporting struts. To mold the main body of the wing, the R.A.E. scientists have developed a technique in which the pressure needed for molding is supplied by the atmosphere.

Construction of the main body begins with the building of a plastic model of the wing's exact size and shape. This is then coated with sheets of Durestos in two layers. After a heat-curing process, the Durestos sheets harden and can be removed from the plaster model; they then form a hollow female mold for the wing, the inner section of which is detachable. After electric heating elements and thermocouples have been fitted to the exterior of the mold, it is surrounded by concrete to give increased strength and stability.

Meanwhile the wing itself is cut from sheets of Durestos, the outer layers being separated from the inner by cellophane and a glass cloth. These sheets are inserted to line the interior walls of the mold, which hangs vertically, the cavity pointing downwards.

A rubber bag, open at one end, is then inserted and is sealed to the exterior concrete, so that the plastic which will form the wing is contained in the airtight enclosure between the mold and the rubber sheeting. By means of a vacuum pump, the air in this enclosure is extracted. Atmospheric pressure on the rubber sheeting is then sufficient to force the plastic against the mold lining, so that, after curing, it takes on the desired shape.

Heat to cure the plastic is provided by the electric elements embedded in the mold. A check is kept on these by means of 99 thermocouples placed at regular intervals throughout the structure. To avoid running numerous wires from these through the vacuum, they are connected to a device resembling an automatic telephone exchange, also built into the mold. By means of this arrangement, a scientist outside can find the temperature of any area of the plastic being cured by dialing the number of the thermocouple on an ordinary telephone dial.

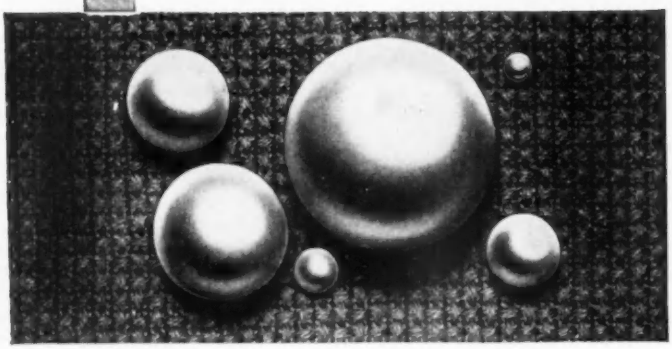
After three of four hours cooking inside the mold, the wing is removed and the outer layer which, before molding, was separated from the inner portion by cellophane and glass cloth, is slid from the inner portion. The latter is then fitted with interior components, which have to be molded separately by hand, while the former is polished.

The outer shell can then be fitted over the completed inner section, so that the final surface of the wing is not broken by protruding bolt heads and rivets. A further period of "cooking" forms the whole wing into one integral structure.

Finally, the completed wing is sanded, coated with a special resin filler, and polished to a hard, glossy surface.

The R.A.E. has limited itself to the development of molded plastic for aircraft, but there is a wide range of other applications, and the possibility of plastic automobiles and boats is being investigated by British firms.

IN size and spherical accuracy
perfection of surface
uniformity—dependable physical quality



NOT A BETTER BALL MADE . . .

And the service results from every Strom metal ball prove it—not only in the finest precision ball bearings but also in the lot of other ball applications where Strom balls are doing the job better.

Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

Strom STEEL BALL CO.
1850 So. 54th Ave., Cicero 50, Illinois
Largest Independent and Exclusive Metal Ball Manufacturer

Another new development using

B. F. Goodrich Chemical *raw materials*

This seal designed and manufactured by Brummer Manufacturing Corp., Chicago Heights, Illinois. B. F. Goodrich Chemical Co. supplies Hycar rubber only.

Two-piece seal for crankshafts stops bearing leaks for good!

PREVENTING oil leaks from rear main bearings of automobile engines was always a tough problem—until an ingenious manufacturer developed this two-piece seal made with Hycar OR (oil resistant) rubber. It not only replaces rope or wicking seals, but also uses a new technique in shaft sealing.

It is made in two pieces. The oil-resistant Hycar rubber is molded into a lip-type seal on a half-circle, U-channel metal band. Two of these half-seals are fitted around the crankshaft and tightened together. Finely ground, the ends of each half-seal form a perfect, tight circle. Result—a positive oil seal . . . and an easy, simple installation method.

Because of Hycar OR's many advantages, it meets the severe service requirements of automotive engines. Hycar withstands high temperatures and abrasion . . . has exceptional resistance to automotive engine oils and greases with added detergents, and engine acids.

Versatile Hycar rubber compounds are used in many applications throughout industry. They can be made to resist heat and cold, weather, abrasion, oil, grease and many chemicals. Perhaps a Hycar rubber compound may help you improve or develop more saleable products—solve a problem you thought couldn't be answered. For helpful technical advice, please write Dept. HG-6, B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, Ohio. In Canada: Kitchener, Ontario. Cable address: Goodchemco.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Hycar
American Rubber

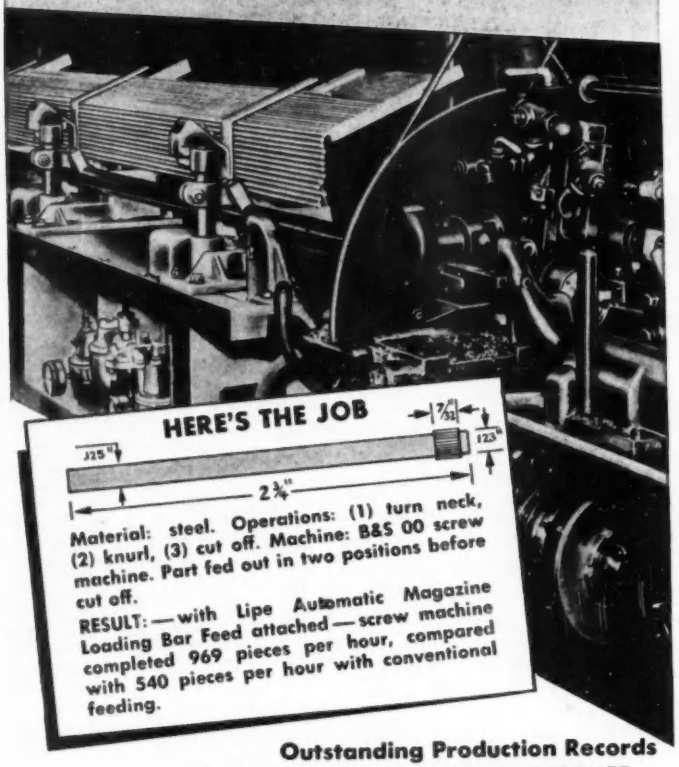
GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors

A New Record

PRODUCTION INCREASED over 80%

By Lipe Automatic

Magazine Loading BAR FEED



HERE'S THE JOB

.125" 7/32" .123"

2 3/4"

Material: steel. Operations: (1) turn neck, (2) knurl, (3) cut off. Machine: B&S 00 screw machine. Part fed out in two positions before cut off.

RESULT: — with Lipe Automatic Magazine Loading Bar Feed attached — screw machine completed 969 pieces per hour, compared with 540 pieces per hour with conventional feeding.

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- Stock is fed to screw machine *all the time* — not dependent upon operator.
- With Model AML you get maximum output of screw machine — No "Cutting Air".
- Pressure constantly behind stock — no bounce.
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Get full details on how this machine will increase production and save you money. It's today's big advancement in screw machine stock feeding. Our engineers are glad to study your problem . . . no obligation.

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Manufacturers of Automotive Clutches and Machine Tools

Syracuse 1, N. Y.

METALS

(*Continued from page 70*)

per lb would be automatically reimposed early in June. This is called for under the law if the market price for lead declines one cent below the ceiling for a month's time.

Lead producers recall unhappily that in March, 1949, their metal dropped precipitately from 21½ cents per lb to 12 cents in two months' time, and started a sympathetic price decline in zinc and copper. Conditions today hardly warrant belief that further adjustment will be so severe. The latest figures on domestic stocks of refined lead show 41,000 tons at the end of March which is 20 per cent lower than stocks in 1949, with the apparent indicated rate of consumption in the months ahead considerably larger than was expected in 1949. It is hardly to be expected that shipments of batteries, which normally account for over 30 per cent of total lead consumption, will continue at the abnormally low rate of 725,000 units in March. In 1950-51 they averaged over 1,500,000 units per month.

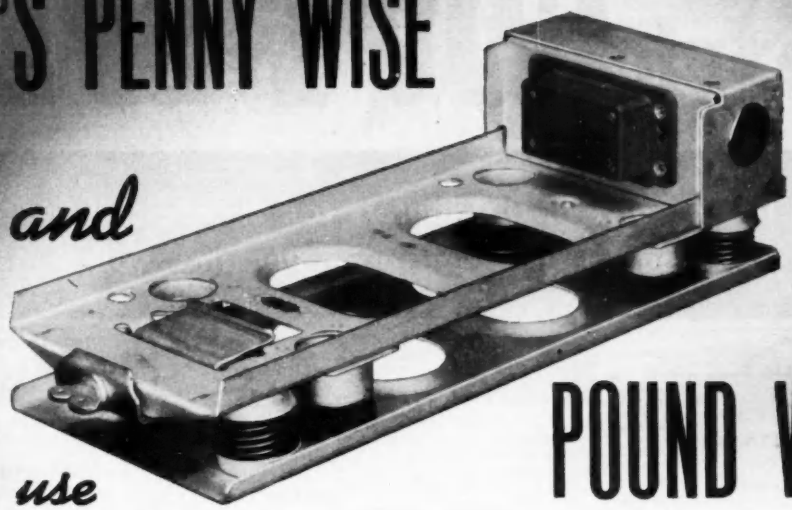
Surplus Zinc Supply Foreseen by Year End

As lead and zinc almost invariably move in unison pricewise there is widespread belief that the zinc price will decline in sympathy with lead. While the price still holds at 19½ cents per lb, buyers are more cautious and most of the current sales are being booked on an average price basis for the month. Zinc producers were thoroughly alarmed during the short-lived shutdown of the steel industry which was followed by requests for deferment of shipments of zinc to the galvanizers. Resumption of work created a more hopeful feeling that demand would continue and the price remain undisturbed. Special High Grade zinc, which has been in easy supply for some time, has been in better demand because of increasing activity in the diecasting industry.

Nevertheless the statistical position of zinc is not reassuring from the producer's viewpoint. Figures revealed at the meeting of the Zinc Institute in St. Louis show that new metal supplies are coming on the market in volume. Domestic production of slab zinc jumped to 85,000 tons in March and imports increased to 41,000 tons, up 10,000 tons over a year ago. American consumers can

IT'S PENNY WISE

and



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ROBINSON ENGINEERED (MET-L-FLEX) MOUNTING SYSTEMS FOR VIBRATION CONTROL

Savings *start* with the *design.* A Robinson engineered mounting system is designed for a specific piece of equipment *and* the conditions under which it must operate. It is not just a combination of a standard tray suspended on stock unit mounts, with potential misalignment and attachment problems.

Savings add up through model, prototype test and production stages. Since you are assured of permanent protection, your engineers can use less rugged components—often saving up to 20% of equipment weight and cost—yet gain better equipment performance.

You save even more directly. The cost of a Robinson engineered system is often less than the total cost of unit mounts plus attachment tray—even when the extra assembly costs they entail are ignored.

During the last ten years every major electronic company, airframe manufacturer, airline and branch of the military service has called on Robinson to help solve some complex problem of vibration control. From these cooperative efforts have come many design "firsts" and basic shock mount improvements. Engineers everywhere have found that when *ounces* and *dollars* count—it pays to call on Robinson; to use the experience that comes only from years of specialized engineering.

Robinson engineered mounting systems, with their exclusive MET-L-FLEX elements, provide maximum vibration and shock protection at any altitude, in any part of the world—and do it *permanently.*

Start saving time and money today. Call on your nearest Robinson engineering representative.

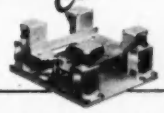
Save on Design

Give your mounting problems to experts in vibration control. Since 1942, Robinson has pioneered many new and effective air-borne mounts, including the first all metal design. Their efficient, production wise designs cut your development costs.

Save on Installation

Use complete MET-L-FLEX mounting bases to prevent misalignment and possible malfunctioning. Instead of the 16 mounting holes and drilling template required by unit mounting bases, Robinson engineered bases have 4 holes, all accurately prespaced.

Save Replacement Costs



Eliminate the usual servicing and replacement expenses. Robinson mounting systems never wear out; never rust; never weaken. They always deliver the same unvarying performance, regardless of environmental or operating conditions; aging or extremes of temperature.

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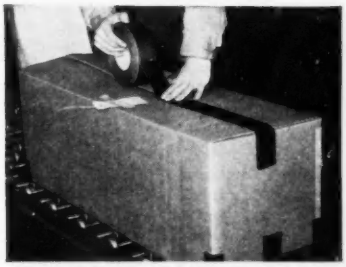
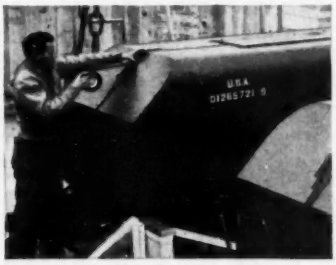
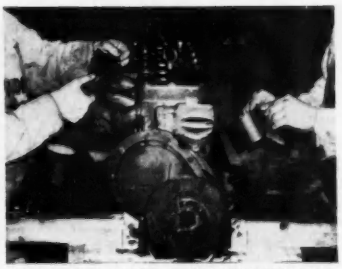


STEWART-WARNER PACKS SOUTHWIND HEATERS for the Army. They use an inner and outer carton and an aluminum foil-lined bag, formerly used two tapes, now seal both cartons with Polyken No. 215.

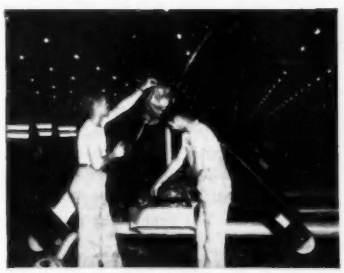


SHIPPING SHOWER BATHS FOR THE ARMY. August G. Barkow Co., Milwaukee, specializes in packing for Gov't Spec and export, uses Polyken No. 214 to seal mobile shower units made by Cleaver-Brooks Co.

BENDIX "CANS" SPARE PLANE PARTS for Navy and Air Force, seals with Polyken waterproof tape. Mechanics in field remove desired parts, reseal cans with same tape.



HOW STUDEBAKER SEALS ENGINES FOR EXPORT. Waterproof Polyken No. 214 seals engine block openings to prevent collection of dust, formation of rust.



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*Also available in all other specification colors.

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Department of Bauer & Black
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METALS

(*Continued from page 90*)

count on about 1,018,000 tons in 1952 against an estimated consumption of 895,000 tons, indicating a possible surplus of 123,000 tons at the year end. Galvanizing requirements are placed at 420,000 tons, brass at 150,000 tons and rolled zinc at 65,000 tons. Even these estimates may be on the high side. They are in sharp contrast with estimates made earlier in the year in Washington when Government officials anticipated a continuing zinc shortage during the year. Recent freight rate increases don't please the zinc producers. They are doubtful if they can pass them on to consumers.

Chile's Abrogation of Copper Agreement Disturbs Metal Market

Announcement by the Chilean government on May 2 that it had cancelled its agreement with the United States which provided for delivery of 80 per cent of the country's copper production at 27½ cents per lb was of national and international importance. At the same time Chile stopped all copper exports to this country effective with May shipments. The president of Kennecott told stockholders at the annual meeting that the copper situation was "strained." This might be termed an outstanding understatement.

Loss of the 267,000 tons of copper, most of it in refined form, that Chile exports annually to the United States would be a body blow to any hope of easing copper curbs on civilian requirements in the second half of the year, and probably would result in further cutbacks. Even without the abrogation of the former copper agreement, the two-week strike at Anaconda's two big Chilean mines, that normally send about 22,000 tons a month of refined copper to the United States, has once more intensified copper scarcity.

Chile wants 33½ cents per lb for its copper. This price it regards as a mean between the 27½ cents it receives from the United States and the 54 cents per lb it had been endeavoring to obtain in European markets for the 20 per cent of its output it retained. Washington has given a deaf ear to a 33½ cent price but it might compromise at about 30 cents. This would almost certainly bring demand from other foreign producers for the same price and domestic copper miners would likewise ask for an increase. Their position would be fortified by early anticipated demand for wage increases patterned after recent WSB awards to steel workers.

Thus it appears that unless Washington is ready to subsidize a higher price for Chilean copper, the higher costs for copper will have to be reflected in higher prices for consumer products that use it. This would mean scrapping existing price ceiling regulations. The real pinch in copper supplies will not be felt for about 90 days as a result of sporadic shutdowns from strikes. It takes about that length of time to mine and process the ore into refined metal for shipment, when work is resumed.

Aluminum Output Keeps Growing

Aluminum production continues to zoom. In the first quarter of 1952 production was 226,377 tons, up 13 per cent over 1951. Stocks of primary aluminum in the hands of producers at the end of March were 3000 tons

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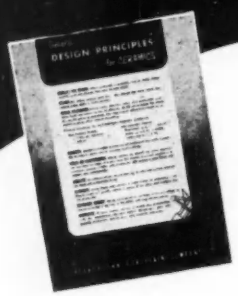

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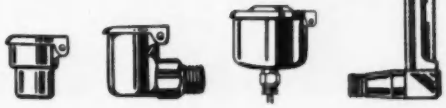

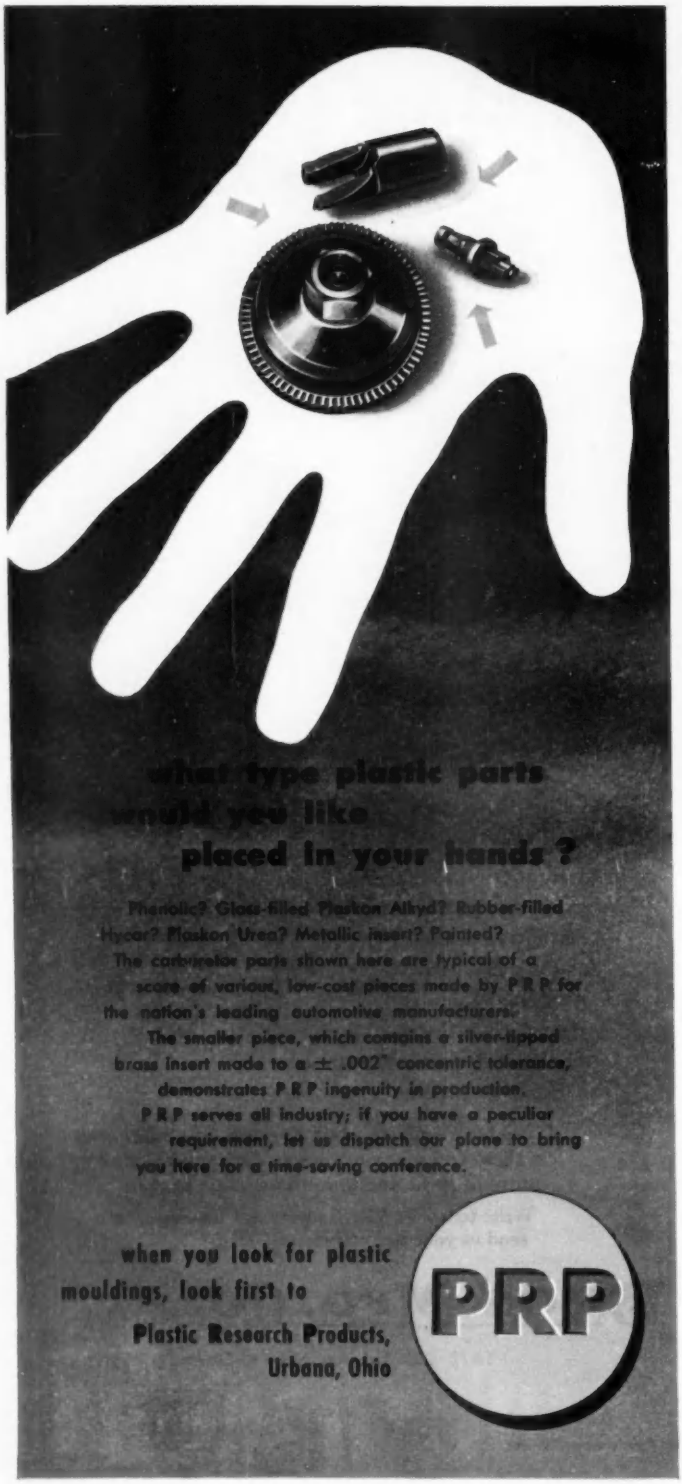
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higher than at the first of the year. Aluminum from Europe is reported to be coming on the market below the domestic price. Present plans for aluminum expansion would bring U. S. primarily capacity to about 1,400,000 tons per year. Most of this capacity will be in effect by the year's end.

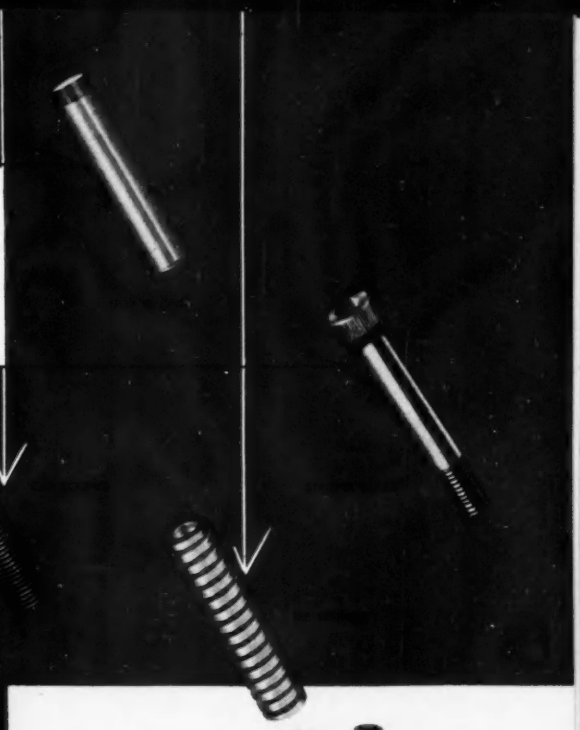
Acute shortage in aluminum supply seems definitely over, although DPA estimates that 66 per cent of our aluminum will be needed for defense purposes in 1952. The Aluminum Co. of Canada has renewed its offer of a long-term contract with the United States and is not asking for a market guarantee. The latest offer calls for Canadian exports of 1,110,000 tons of aluminum between now and 1958, or about 200,000 tons on an annual basis between 1955 and 1958. The Canadian Co. is currently building a huge new aluminum production project in British Columbia to cost over $300 million and is anxious to contract for its new production. Copper producers are keeping a watchful eye on aluminum expansion. They feel that an increase in the price of copper might not work out to their advantage if the aluminum price remains stable as it would increase the competitive advantage of the latter in markets where either metal can be used.

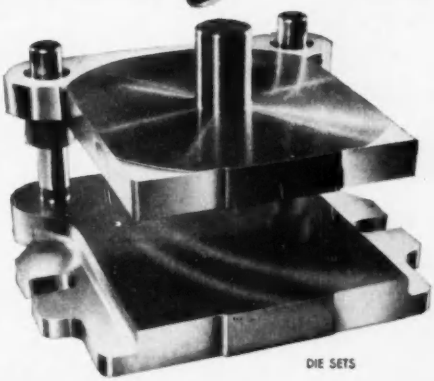
Tin Supply Uncertain

The key to the tin situation is Bolivia. It is reported that 10,000 tons of tin, or about 75 per cent of its annual exports to the United States, are awaiting shipment when a price is agreed upon. American consumers need that tin. Our minimum requirements are about 62,000 tons per year and would normally exceed 75,000 tons. About 75 per cent of this would normally come from Malaya and Indonesia with Bolivia furnishing most of the balance.

The new Bolivian government is considering nationalization of the tin mines but it seems doubtful if it will take so radical a step. A higher price for tin might satisfy them and the cost to the U. S. would be comparatively little. As the amount of tin that enters into end products in industry is usually small, a higher price could be absorbed without much protest. In the meantime tin production at the U. S.-owned Longhorn smelter in Texas declined to 1800 tons in April, a drop of 1200 tons from March. Malayan tin shipments in April, however, were the highest since November, 1950, with the United States taking nearly 70 per cent of the total.

A Good, Fast Start for Your Tooling Program





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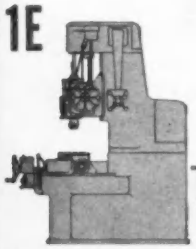
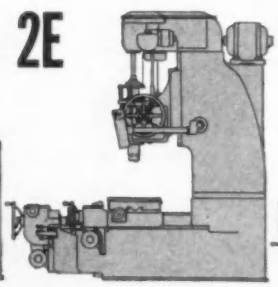
COMPLETE RANGE OF SIZES

1E



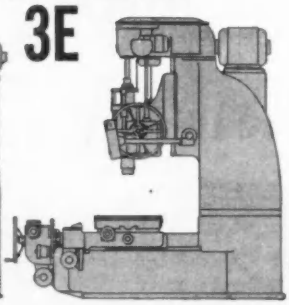
Made in two sizes: 12" x 24" table with 18" and 12" travels, and 12" x 42" table with 36" and 12" travels.

2E



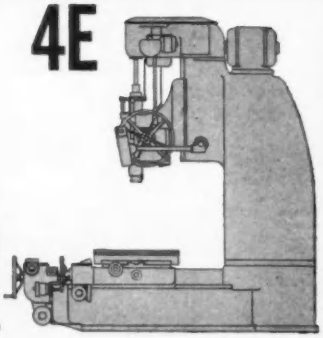
22" x 44" table with 36" and 22" travels.

3E



28" x 56" table with 48" and 28" travels.

4E



36" x 72" rectangular table or combination 48" rotary and rectangular table, with 60" and 36" travels.

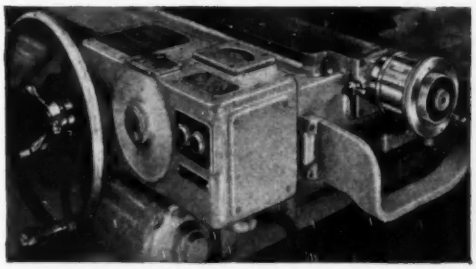
PRATT & WHITNEY

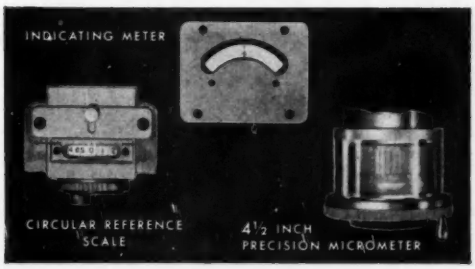
Electrolimit JIG BORERS

Pratt & Whitney **Series "E" Jig Borers** meet today's demand for fine accuracy, versatility, greater capacity and increased speed of operation. These machines **are** accurate and **stay** accurate. Locating, boring and checking to .0002" accuracy is accomplished positively, faster and with greater ease than ever before. P&W open-side construction accommodates larger work . . . provides maximum operator convenience . . . reduces "per-piece" cost. An outstanding feature is the **Ball Roll Quill Spindle.** Roll feeding on preloaded, super-precision ball bearings, this mounting maintains its accuracy and rigidity indefinitely without maintenance of any sort.

Each Series "E" Jig Borer is machined, hand scraped, assembled and inspected to meet the inflexibly high Pratt & Whitney standards that are your guarantee of the ultimate in lasting accuracy.

NEW *Electrolimit* MEASURING SYSTEM





This new method of locating the table is based on the time-proved principle of the Pratt & Whitney Electrolimit Precision Gage. It is fast and easy to use, extremely accurate and absolutely positive. Basic 1 inch spacings are obtained electromagnetically from a solid master bar. **There are no contacting surfaces, no wear.** Original accuracy is retained indefinitely. Fractional inches are provided by a high precision micrometer screw. Two completely independent measuring units control the longitudinal and transverse settings. Both are located at the operating position for greater operator convenience.

Shown above are the three "operating" units of the Electrolimit Measuring System:

Circular Reference Scale — for fast, approximate settings.

Indicating Meter — for the **exact** locating of zero readings (this scale is a visible assurance of tenths-of-a-thousandth accuracy at all times).

4½" Precision Micrometer — for the easy reading of direct settings to .0001". Even finer estimated settings are possible.

For additional information, write on your company letterhead to your nearby Pratt & Whitney Branch Office listed below.

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY

WEST HARTFORD 1, CONNECTICUT, U. S. A.

First Choice for Accuracy

BRANCH OFFICES: ATLANTA • BOSTON • CHICAGO • CINCINNATI • CLEVELAND
DALLAS (Pratt & Whitney Co.) • DETROIT • HOUSTON (Pratt & Whitney Co.) • LOS ANGELES • NEW YORK
PHILADELPHIA • PITTSBURGH • ROCHESTER • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., WEST HARTFORD

Testing Parts for Leaks with High Vacuum Equipment

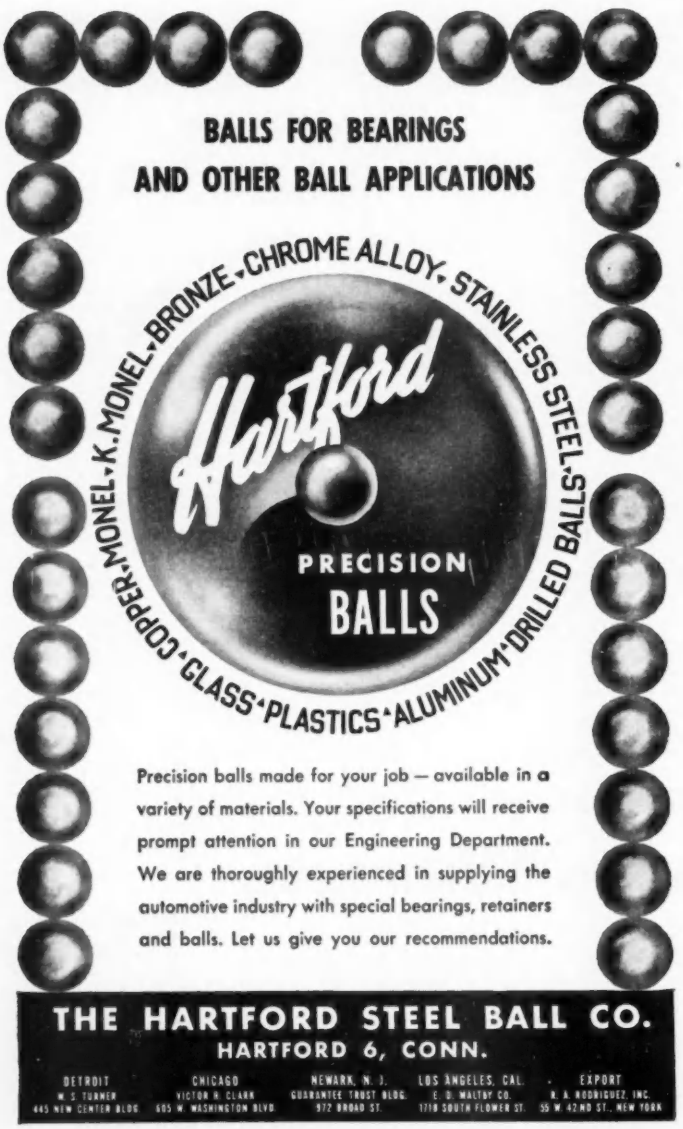
Considerable impetus has been given recently to the technique of "dry" testing metal parts by means of high vacuum testing equipment engineered by the Whittington Pump & Engineering Co., Indianapolis, Ind. The method is particularly indicated on applications designed to detect leaks in parts such as cylinder blocks, manifolds, oilpans, transmission cases, axle housings, fuel tanks, filler pipes, etc., where pressure tightness is essential.

Some years ago, pioneering work was done in vacuum testing of water pumps and since then the list of useful applications has grown to include the parts listed above. One of the most recent applications is in the proof testing of windshield wiper motors before installation in bodies.

Successful installations in prominent automotive plants indicate that the "dry" testing technique is faster, more accurate and certain, and more economical than the conventional methods of testing under pressure or bubble testing in water tanks.

Equipment for this purpose is tailor made for each application, the machines being of single-station type or multiple-station type for mass production. Test equipment is relatively simple, usually comprises a Whittington high vacuum pump and valve chamber mounted under the table top.

Many recent units include air cylinders for positioning the neoprene pads accurately; and timers to assure testing of each part for the same time interval. The speed of the operation, ranging from 20 to 30 seconds floor to floor time, is so rapid as to make this technique a natural for mass production operations.


BALLS FOR BEARINGS
AND OTHER BALL APPLICATIONS
COPPER • MONEL • K-MONEL • BRONZE • CHROME ALLOY • STAINLESS STEEL • GLASS • PLASTICS • ALUMINUM • DRILLED BALLS
Hartford
PRECISION
BALLS
Precision balls made for your job — available in a variety of materials. Your specifications will receive prompt attention in our Engineering Department. We are thoroughly experienced in supplying the automotive industry with special bearings, retainers and balls. Let us give you our recommendations.
THE HARTFORD STEEL BALL CO.
HARTFORD 6, CONN.
DETROIT
W. S. TURNER
445 NEW CENTER BLDG.
CHICAGO
VICTOR H. CLARK
605 W. WASHINGTON BLVD.
NEWARK, N. J.
GUARANTEE TRUST BLDG.
972 BROAD ST.
LOS ANGELES, CAL.
E. D. MALTBY CO.
1719 SOUTH FLOWER ST.
EXPORT
R. A. RODRIGUEZ, INC.
55 W. 42ND ST., NEW YORK

New French Vehicle for Land or Water

(*Continued from page* 32)

forward and is of the conventional type, the output shafts being connected to lever-operated clutches, through which the vehicle is steered. There are only two points at which prortection has to be taken against the ingress of water and no difficulty has been experienced in this respect.

When water borne, the vehicle is driven by a three-blade propeller operating at engine speed. There are two versions of the propeller drive mechanism. For civilian use the propeller and its tail shaft are removable and can be taken off or reinstalled quickly without the use of tools. Between the engine and the propeller shaft there is a Tracta universal joint, through which the drive is taken. Steering is effected by pivoting the vertical housing of the propeller, a simple system of cables and a steering wheel being used for this purpose. For military use, where it might be inadvisable to stop before entering the water, a pivoted type housing is used. It is lowered to engage with the engine shaft when desired.

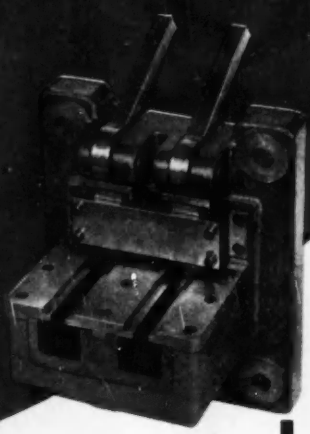
The Moglia vehicle has a weight of 6300 lb and its maximum road speed is approximately 40 mph. Ground pressure is 1.7 psi, and this is reduced to 1.6 psi when disks are fitted for operating in water having an insufficient depth to assure floating.

BOOST PRODUCTION!..

MAKE DIFFICULT PARTS

Interchangeable

Parts before and after broaching.



BROACHES BY Continental

The half-round slots in these stainless steel aircraft tubing clamps were formerly drilled and reamed. The process was slow. To make matters worse, no two parts were exactly alike.

Continental engineers designed broaches and fixture to do a completely uniform job in far less time. Parts are now fully interchangeable.

For information on how Continental Broaches may help increase your production, with improved accuracy and finish, call in your local Ex-Cell-O representative, or write, wire or phone Continental in Detroit today.

52-9

CONTINENTAL TOOL WORKS DIVISION OF EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

HIGHLIGHTS FROM OUR RECORD IN THE ARTS

- Led the way in putting karat gold and sterling silver alloying and rolling on a scientific basis.
- Created compositions to meet advancing jewelry and silverware production requirements.
- Developed methods and equipment for producing gold and silver alloys which assure uniformity in quality, working properties, gauge and finish.
- Originated new and better gold solders, silver solders and fluxes.
- Developed methods and equipment for refining precious metal scrap and waste which assure accurate recovery.
- Produced silver anodes of exceptional fineness, purity and uniformity for trouble-free production plating.
- Aided a great many jewelry and silverware manufacturers in solving specific precious metal problems.

our Customers
who made it possible

As we start on our 86th year of continuous operation, we want to express our appreciation to our thousands of customers in the Arts and Industry who have made possible our progress from a small beginning to an important unit in American business.

You'll bear with us for being a bit proud of our record—the highlights of which are mentioned below.

At the same time, we pledge to all customers, old and new, a continuance of the high quality of *product* and *service*, and the constant seeking for improvement that have become traditional with us.

Handy & Harman

General Offices: 82 Fulton St., New York 38, N. Y.

OFFICES AND PLANTS: *BRIDGEPORT, CONN. • PROVIDENCE, R. I. • CHICAGO, ILL. CLEVELAND, OHIO • DETROIT, MICH. • LOS ANGELES, CAL. • TORONTO, CANADA*

DISTRIBUTORS IN PRINCIPAL CITIES

HIGHLIGHTS FROM OUR RECORD IN INDUSTRY

- First and foremost in standardizing silver solders.
- Created new silver brazing alloys to meet new industrial requirements.
- Originated EASY-FLO and SIL-FOS low-temperature silver brazing alloys that set new standards of strength, speed and economy in metal joining.
- Won 6 Army-Navy "E" awards for production of EASY-FLO and SIL-FOS and for giving assistance to users during World War II.
- Helped thousands of manufacturers apply these alloys to an amazing range of metal joining in both domestic and defense production.
- Advanced silver alloy-brazing uses and benefits through unceasing research, engineering aid and training programs.
- Developed new uses of silver and its alloys for Industry . . . silver-clad metals, powdered metals, solder flushed metals, silver paint, etc.

Industry News

(*Continued from page* 24)

API Discloses New Oil Designations

The new system of service classifications and designations for automotive lubricating oils was recently announced by the Lubrication Committee of the American Petroleum Institute. The new nomenclature was devised after it became apparent that advances in additive-treated motor oils had made existing crankcase oil terminology inadequate and obsolete.

The new classifications are as follows:

Service MS—Service typical of gasoline or other spark ignition engines operating under unfavorable or severe types of service conditions and where there are special lubrication requirements for deposit or bearing corrosion control, due to operating conditions or to fuel or to engine design characteristics.

Service MM—Service typical of gasoline and other spark ignition engines operating under moderate to severe service conditions, but presenting problems of deposit or bearing corrosion control when crankcase oil temperatures are high.

Service ML—Service typical of gasoline and other spark ignition engines operating under light and favorable service conditions, the engines having no special lubrication requirements and having no design characteristics sensitive to deposit formation.

Service DG—Service typical of Diesel engines in any operation where there are no exceptionally severe requirements for wear or deposit control due to fuel or to engine design characteristics.

Service DS—Service typical of Diesel engines operating under extremely severe conditions or having design characteristics or using fuel tending to produce abnormal wear or deposits.

ACF-Brill to Produce Military Truck Units

ACF-Brill Motors Co. has been authorized by the Philadelphia Ordnance District of the U. S. Army to immediately proceed on the re-manufacture of a large quantity of 2½ ton six by six motor vehicles to be delivered on an accelerated schedule.

While the exact quantity of vehicles was not disclosed, it was stated that this order will immediately activate a large part of ACF-Brill's 30 acres of productive plant facilities. Each Army vehicle will be torn down and rebuilt to new equipment standards in a state of combat readiness.

ASME Looks Forward to Busy Meeting

Twenty-one divisions and committees of the American Society of Mechanical Engineers and five engineering societies will participate in the 1952 semi-annual meeting of the ASME in Cincinnati, O., June 16 to 19. A total of 86 papers dealing with almost every field of mechanical engi- will be presented at 38 sessions.

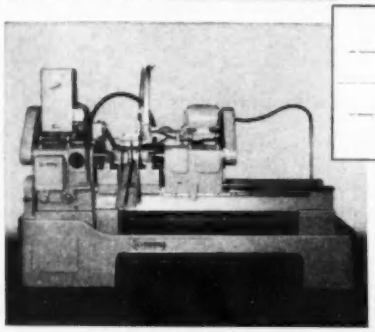
Rohr to Build Plant for Jet Pod Work

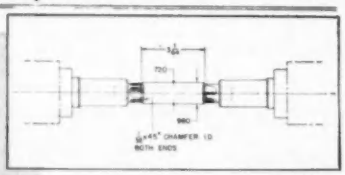
Rohr Aircraft Corp. is said to be planning construction of a $2 million subassembly plant at Riverside, Calif. The new unit will produce jet pods for the Boeing KC-97 Stratotanker and is expected to be in operation about Nov. 30.

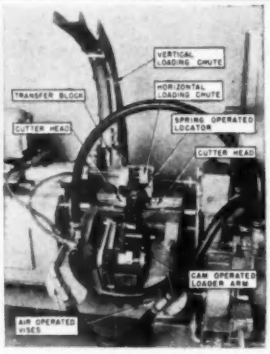
(*Turn to page* 106, *please*)

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-swing PEOPLE" SENECA FALLS, NEW YORK







MODEL "CS" So-swing AUTOMATIC DRILLING AND CENTERING MACHINE CUTS PISTON PIN MACHINING COSTS

Problem: To automatically chamfer bore on both ends of piston pins on a high production basis.

Solution: The Model "CS" Lo-swing Automatic Drilling and Centering Machine selected for this job was equipped with an Automatic Loader of the type shown above. After being partially machined in an automatic lathe, the piston pins are fed endwise into the vertical chute and carried to a transfer block, which automatically indexes the parts in horizontal position. An air-operated plunger then ejects the pieces from the transfer block into the horizontal loading chute, where they are picked up by the cam-operated loader arm, placed and clamped in the air-operated vise jaws. The loader arm is fitted with an equalizing device to so position the parts that the chamfers on both ends are to the same dimensions.

Upon completion of the loading cycle, the two revolving cutter heads advance in rapid traverse, then slow down to feed just before the tools reach the work. The machining completed, the cutter heads retract in rapid traverse and the vise jaws open, allowing the finished part to drop into the unloading chute, located on the front of the machine.

The complete cycle is three seconds, assuring a production of 1200 pieces per hour at 100% efficiency. The line illustration above shows the operations performed as well as dimensions of the piston pin.

Engineered jobs are our specialty. Seneca Falls engineers are always at your disposal to assist in solving your problems.

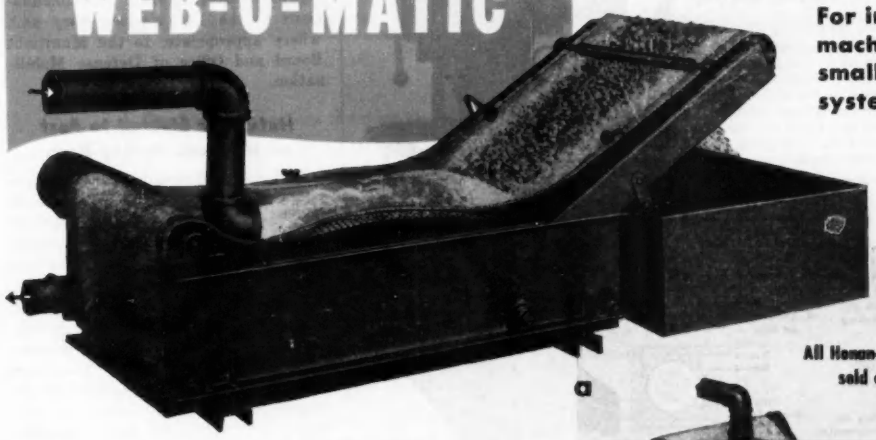
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH So-swing

cut filtering costs up to 75%

with New Automatic Self-Cleaning COOLANT FILTER

Houdaille WEB-O-MATIC



For individual machines or small central systems

All Honan-Crane equipment sold on a performance guaranteed basis

a

b

Two Types Available

(a) **Houdaille WEB-O-MATIC with built-in ramp for applications requiring above-floor installation.**

(b) **Houdaille WEB-O-MATIC for applications requiring discharge of chips and contamination below floor level.**

Eliminates frequent, costly filter changes...takes up less floor space

New WEB-O-MATIC Coolant Filter employs rotating filter belt that cleans itself . . . reduces filter operating and maintenance expense up to 75%! Continuous, automatic operation requires virtually no attention, effectively removes chips, abrasive particles, harmful solids. Handles large volume of coolant in minimum floor space; 50 GPM model (for soluble oil coolant) is only 43" x 53½".

Mesh and speed of belt may be varied to suit volume, viscosity and contamination of coolants. WEB-O-MATIC is ideal for all types of grinders, broaches, drilling, lapping, milling machines, etc., wherever a mineral or soluble oil coolant is used. Capacities 50 to 400 GPM of soluble oil coolant.

Write for WEB-O-MATIC Bulletin with complete information, specifications, etc.

WORLD'S LEADING OIL FILTER MANUFACTURER

Honan-Crane Corp. 404 Madison Avenue, Lebanon, Indiana

A Subsidiary of **Houdaille-Hershey Corporation**

In Canada: E. W. PLAYFORD, LTD., Montreal 28
W. E. MICKLETHWAITE, Toronto 18
CUMMINGS GALBRAITH, LTD., Edmonton, Alta.

SIX SPINDLE
PRE-SELECTIVE SPINDLE SPEEDS
TURRET TYPE AUTOMATIC INDEXING
DRILLING AND TAPPING MACHINE

. . gives you 6 MACHINES IN ONE

THE NEW No. 2 MODEL A

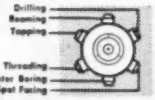
Burgmaster

Designed for . . .
HIGHER PRODUCTION WITH GREATER ACCURACY AT LOWER COST PER PIECE MACHINED

The No. 2 Model A BURGMASTER will definitely cut your second operation costs because: Loss of time due to movements of parts from one spindle to another are eliminated; Close tolerances on size and concentricity are easily maintained; Set-up is simple and fast — unskilled operators can run the machine; Less floor space and power required; Rigidity, power and spindle speeds permit the use of high cutting speeds.

Now equipped with Warner electric clutch units in speed change mechanism.

- ★ ¾" Drill Capacity
- ★ ½" Tap Capacity
- ★ 1 to 2 H.P., 2 speed, 3 phase, 60 cycle Motor
- ★ 12 Spindle Speeds, ranging from 225-3000 R.P.M
- ★ 4 Speeds, pre-selective per spindle, at any one setting
- ★ 8" Ram Feed
- ★ 19" Table Travel
- ★ Throat Depth—11-5/16"
- ★ Spindles Mounted on Class "O" Timken Bearings
- ★ Power Index, utilizing Geneva Mechanism
- ★ Individual Depth Stops
- ★ Completely Enclosed Gear Box
- ★ Table work surface—17"x33"
- ★ Approximate weight—1650 lbs.
- ★ Floor space required— 36"x 48"
- ★ Extremely close tolerance can be held



Write today for detailed information.

BURG TOOL MANUFACTURING CO. DEPT. AI6
3743 DURANGO AVENUE • LOS ANGELES 34, CALIFORNIA

HERE'S Tool-flex
NEOPRENE MOUNTED FLOATING TOOL HOLDERS
Another Outstanding Product of
BURG TOOL MANUFACTURING CO.

SELF-CENTERING
(ELIMINATES COSTLY SET-UP)
FULL-FLOATING • POSITIVE DRIVE
OIL-RESISTANT NEOPRENE MOUNTING
REDUCES TOOL BREAKAGE
SIMPLE CONSTRUCTION
(ONLY FOUR MAIN PARTS)

Write for information . . . Dealer inquiries invited

BURG TOOL MANUFACTURING CO. Dept. AI6
3743 DURANGO AVE. • LOS ANGELES 34, CALIF.

Industry News

(*Continued from page* 104)

Vance Named to Head New Defense Body

Long-range production problems will be studied and advice on handling them presented to the Secretary of Defense by a newly-created Production Policy Advisory Commission, directed by Harold Vance, chairman of the board and president of Studebaker Corp.

Aim of the group is said to be to promote a maximum of defense production capacity at a minimum cost to the Government. The commission will review output plans and expediting procedures, offering recommendations to the Defense Secretary and, where appropriate, to the Munitions Board and Office of Defense Mobilization.

Hufstader Elected to Post on Highway Safety Body

William F. Hufstader, General Motors Corp. vice president in charge of the Distribution Staff, was recently elected chairman of the Inter-Industry Highway Safety Committee for the coming year.

The committee, operating chiefly through state and local dealer safety committees and organizations, encourages and supports safety programs based on the recommendations of the President's Highway Safety Conference. It is sponsored by automobile and tire manufacturers and the National Automobile Dealers Association.

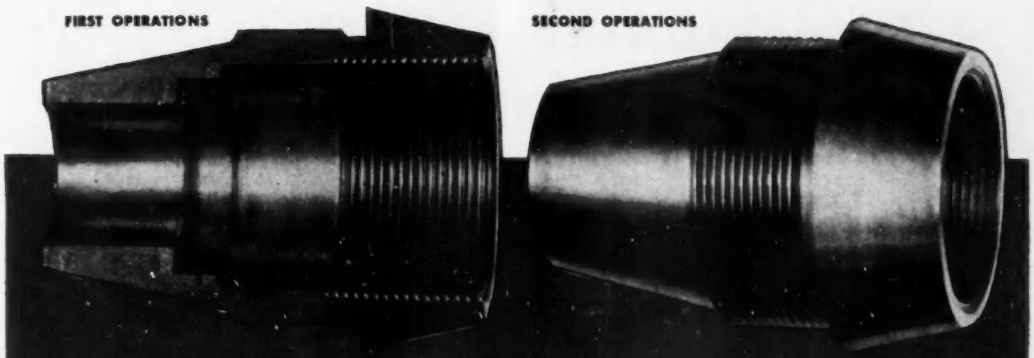
Ohio Electric Creates New Aircraft Division

A new division for the manufacture of precision ground and roll threaded aircraft engine parts was recently announced by Ohio Electric Manufacturing Co. The division is said to be under contract to several major manufacturers of aircraft jet and reciprocating engines.

Mercury Brake Sets Up Die-Casting Division

According to a recent report, a rapidly increasing demand for its line of new hydraulic brake cylinders has resulted in the installation of a new Aluminum Die-Casting Div. by Mercury Brake Products Co. Property has already been purchased to accommodate an additional 25,000 sq ft of space adjoining the company's present quarters.

(*Turn to page* 110, *please*)



ACME-GRIDLEY PERFORMANCE...*73 SECONDS!*

for complete machining of this familiar steel job

1. The first 15 operations are done on a 3½" six spindle Acme-Gridley Bar Automatic in ..... **57 SECONDS**

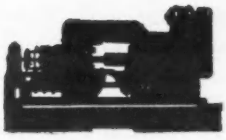
2. The secondary operations are done on a double indexing 8" eight spindle Acme-Gridley Chucking Machine (2 per cycle) at the rate of ..... **16 SECONDS**

Total multiple spindle machine time ..... **73 SECONDS**

A 2 1/16" Namco Collapsible Tap and a 3½" five chaser Vers-O-Tool, both with ground thread chasers, cut the smooth 12 NF class 2 threads.

Here is another outstanding example of the economies that result from studied tool engineering co-ordinated with time-proved machine design—a combination for which The National Acme Company is justly famous. *Again we say:*

No other source offers a line so complete—so much design and tooling experience in multiple and single spindle bar and chucking automatics—more than 45,000 machines built.

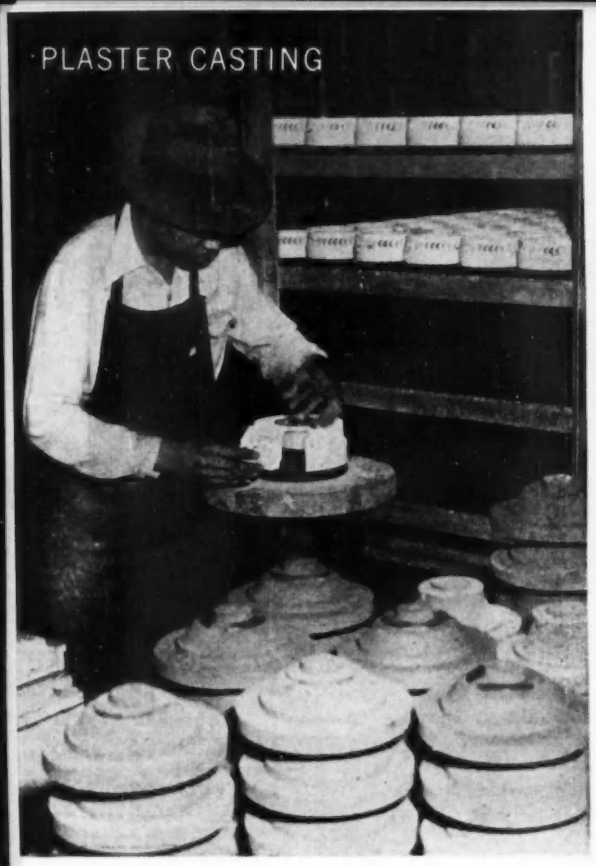


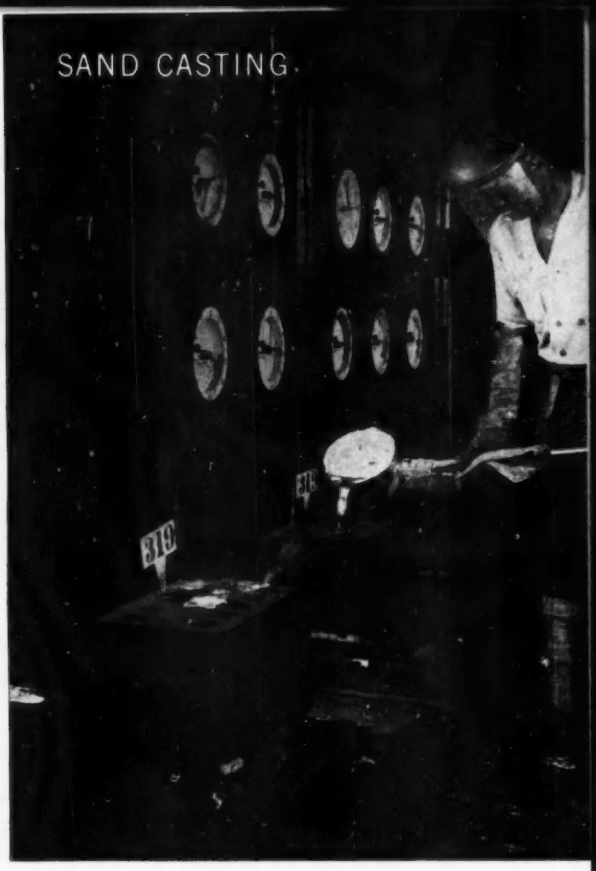
Whether for defense or civilian production, it will pay you to ask for Acme-Gridley's production figures on the work you are doing or contemplate. Send prints or samples.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Meter Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing





ALCOA MAKES LIGHT METAL CASTINGS BY ALL FOUR PROCESSES

When you discuss your casting job with an Alcoa sales engineer, you can be sure that he will recommend the process that best fits your needs. If your part should be die cast, two modern die casting plants and 30 years' die casting experience back his recommendations. He can also suggest sand casting, for Alcoa has five sand foundries and 41 years' experience in the casting business. Permanent mold castings? Four of our foundries make permanent mold castings. One in Detroit specializes in plaster casting. Obviously, Alcoa sales engineers have no axe to grind for any one process.

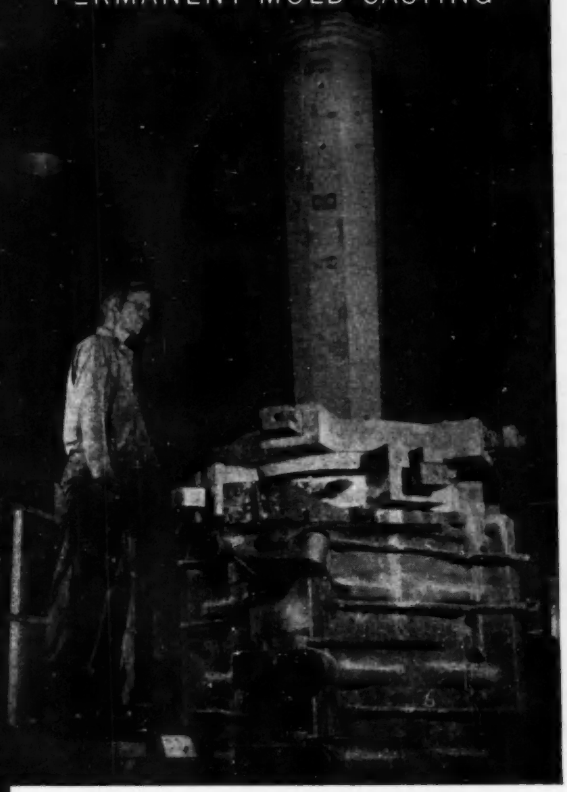
The same applies to choice of light metals. Alcoa's casting facilities are equipped to handle both aluminum and magnesium. Alcoa casting specialists are old hands at working with light metals. Alcoa engineers are completely unbiased in their approach to any question you might put to them. For these reasons, Alcoa sales engineers are quick to point out the advantages of both aluminum and magnesium for your application.

Your first step toward using these extensive facilities is to call your local Alcoa sales office—listed under "Aluminum" in the classified phone book. Or write:

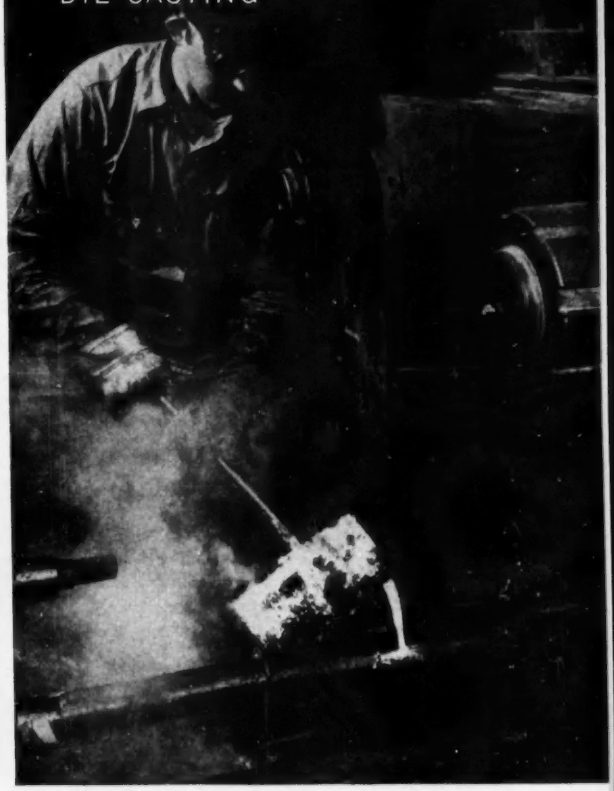
ALUMINUM COMPANY OF AMERICA
1903-F Gulf Building • Pittsburgh 19, Pa.

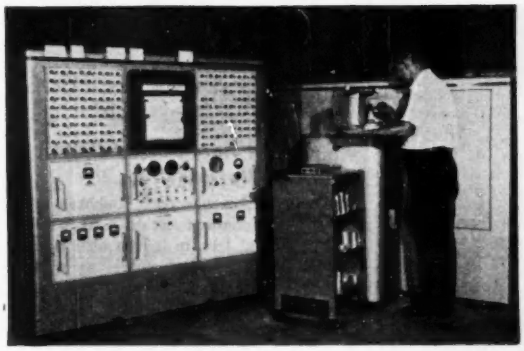
ALCOA ALUMINUM ®

PERMANENT MOLD CASTING

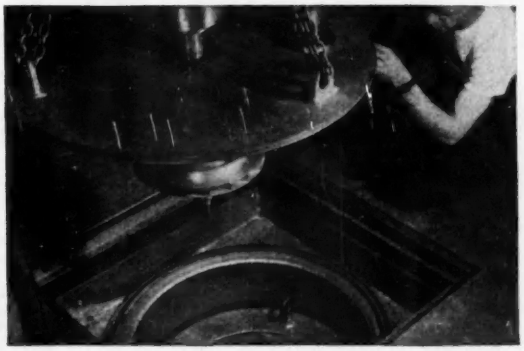


DIE CASTING





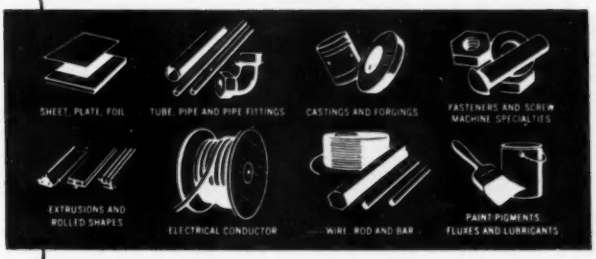
ALLOY CONTROL—Alcoa foundries are equipped with direct reading quantometers, like this. In less than a minute, these instruments provide a complete spectrographic analysis of an alloy being cast.



RESEARCH TEST—In Alcoa's 70,000 rpm whirlpit, rotating parts can be tested to destruction. Provision is also made for brittle lacquer and strain gage investigation while the rotating part is under stress.

ASK ALCOA FIRST
WHATEVER YOUR NEED IN ALUMINUM

Your local Alcoa sales office is headquarters for "everything" in aluminum. Look for Alcoa under "Aluminum" in your classified phone book.



Industry News

(Continued from page 108)

Defense Dept. Obligates $29.1 Billion in Period

During the first nine months of fiscal 1952 (July, 1951 to March, 1952), the Dept. of Defense obligated $29.1 billion for the procurement of major equipment, supplies, military construction, and expansion of production facilities. Of this, the Army has obligated $10.7 billion, the Navy $7.9 billion, and the Air Force $10.5 billion.

Obligations for procurement of "hard goods" (aircraft, ships, tanks, weapons, ammunition, production equipment, electronics, and other equipment) amounted to $24.4 billion, with "soft goods" procurement obligations (clothing, subsistence, and petroleum) aggregating $3.3 billion and construction $2.6 billion. Procurement for the Mutual Security Assistance Program accounts for $2.4 billion of the $24.2 billion obligated for "hard goods."

As of April 1, 1952, $21.3 billion was still available for obligation by the Dept. of Defense for procurement and construction programs, with $16.3 billion available for "hard goods," $.5 billion for "soft goods," and $4.1 billion for construction. The bulk of these funds are expected to be obligated during the remaining three months of the current fiscal year.

HARDENED & GROUND PARTS
to exact specification
This spring pivot bolt typifies our machining versatility and strict adherence to specifications. Bolt is made from 1⅞" high-carbon alloy steel hex bar stock; overall length, 5⅞". Threads are precision cut, concentric with body diameter. After heat treating, threads are re-threaded to the specified pitch diameter. Bearing surface is ground to a fine micro-finish, ± .001 tolerance. The very latest equipment is used to make the knurling clean and sharp.
Brown Hardened and Ground Parts have served the automotive industry for over 40 years. Our specialty is precision machining, scientifically-controlled heat treating and micro-finish grinding. How can we serve you? Write or wire . . .
Experienced production on
King Pins
Shackle Bolts
Shackle Pins
Brake Anchor Bolts
Countershafts
Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
Beam Balls and Bolts
Stk'Wheel Rocker Shafts
Wheel Studs
Water Pump Shafts
anything in the hardened and ground line, of any analysis steel, up to 4"
Henry W. Brown
President
THE BROWN CORP.
213 BELLEVUE AVE. SYRACUSE, N. Y.
C. H. Eklort, 2407 Clarendon Rd., Cleveland • N. F. Spring, 4716 Balfour Rd., Detroit • R. C. Sanderson, 2659 N. Clark St., Chicago • Harry J. Windmiller, 1701 Carlton, Fort Worth • Johns Williams & Co., 1449 N. Spring St., Los Angeles, Calif. • John B. Hunt, 3611 S.E. Yamhill St., Portland, Ore.

Prewitt Signs Rotor Blade Contract With Piasecki

Prewitt Aircraft Co. has announced the signing of a contract with Piasecki Helicopter Corp. for the production of bonded steel rotor blades for the Navy's HUP-2 helicopter, manufactured by Piasecki.

The contract is a "letter-of-intent" agreement under which Prewitt has been producing the steel rotor blades which will soon be replacing wooden blades on some of the HUP-2 helicopters.

All States Now Approve Tinted Glass for Cars

Tinted heat-absorbing glass for use in automobiles finally has met official approval in all 48 states. Massachusetts, the last state to endorse its use, gave its final approval in April, after exhaustive tests with a shaded windshield developed by Libbey-Owens-Ford Glass Co. more than a year ago. There presently are more than 300,000 cars equipped with tinted glass now on the highways.

Cornell Aeronautical Unit Sets Up Industrial Div.

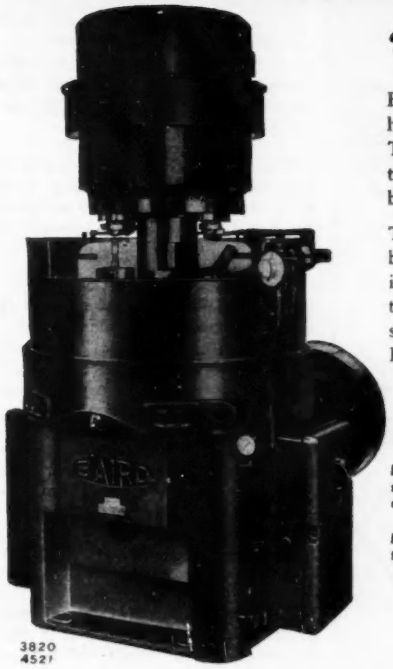
Cornell Aeronautical Laboratory recently announced establishment of an Industrial Div. to insure attention to industrial research needs as well as continuing its heavy military research schedule.

BullDog Cuts Its Panelboard and Circuit Breaker Prices

BullDog Electric Products Co., has announced price reductions on its complete line of Pushmatic Electri-Center panelboards and Pushmatic circuit breakers. This price reduction is said to be the result of increased production and improved manufacturing techniques. The company recently expanded its facilities to a total of five plants in Michigan and Ohio, each specializing in the production of a specific product line.

ASK BAIRD ABOUT IT!

HIGH PRODUCTION TOOLING



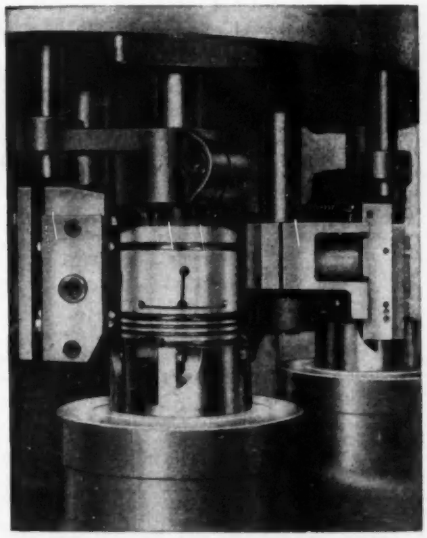
It's AUTOMATIC . . *it's* FAST . . *it's* ACCURATE

FEATURES: Turret (work spindle carrier) turns continuously, grip of holding fixtures automatically releasing for operator to unload and load. Tools move horizontally for facing operations . . . other tools vertically for turning operations. Machine is designed for dry or wet cutting of light jobs, boring piston ends, facing, turning bands, ogives, etc.

The turret is driven through worm and gears . . . spindles mounted in roller bearing and driven by helical gears. Changes in all speeds are easy . . . inexpensive. Convenient spindle control station at left, control at right for turret and tool arms . . . arranged to prevent feed of tools to work unless spindles are revolving. Both turret and spindles are driven by V belts. Electrical equipment is enclosed, wiring concealed.

Left: Front view, showing splash guards for wet cutting.

Right: A close-up view of typical tooling set-up.



BAIRD 4-SPINDLE VERTICAL CONTINUOUS LATHE

The machine mounts four 5" chucks on a spindle circle of 18". Spindle speeds 240–860 r.p.m. Longitudinal tool stroke 3¼" . . . cross tool stroke 2¾". Feeds .001" to .030" per revolution. Spindle drive 3 to 5 H.P. with push button control; machine drive 1 H.P. Spindle carrier cycle time 12–38 seconds. Production time 3–9 seconds per piece. Cutting time 9–28.5 seconds. Now's the time to "ask Baird about it."

HORIZONTAL AND VERTICAL TOOLING

the **BAIRD MACHINE COMPANY**
STRATFORD • CONNECTICUT

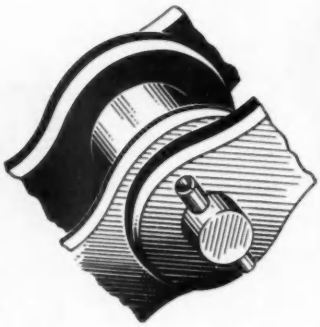
AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

Fastener Problem of the Month

Fastening Roller Chain Link Pins **June 1952**

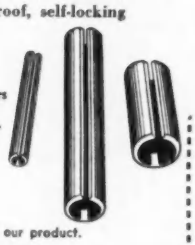
PROBLEM: Heavy duty roller chain must be built to withstand severe operating impact and vibrations as a matter of routine. For many years, cotter pin breakage has been a serious problem for roller chain manufacturers. The Morse Chain Company searched for a more satisfactory method of locking link pins.

SOLUTION: Rollpins, now used in both standard and heavy-series Morse Roller Chains, have provided the ideal fastening method. Rollpins—slotted spring steel cylinders with chamfered ends—are simply driven into holes drilled to normal production tolerances. Because they exert constant pressure against the hole walls, they are permanently self-locking. Extensive "fatigue testing" has shown that Rollpins are vibration-proof . . . outlast cotter pins by more than 10 to 1. They are readily removable with a hammer and punch, and can be reused. With Rollpins, Morse has saved time on chain assembly and provided a chain that requires less maintenance than any other comparable chain.



YOUR PROBLEM may have an equally satisfactory ESNA solution. Mail our coupon for design information on vibration-proof, self-locking ESNA fasteners.

. . . wide variety of lengths and diameters



Dept. BB-65, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, N. J.

Please send me the following free fastening information:

☐ Rollpin Bulletin ☐ Here is a drawing of our product.
☐ AN-ESNA Conversion Chart What fastener do you suggest?

Name ..... Title .....

Firm .....

Street .....

City ..... Zone ..... State .....

MEN *in the* NEWS

(Continued from page 25)

Revere Copper and Brass, Inc.—**Wallace H. Hitchcock** and **Chester M. McCreery** have been elected vice presidents.

General Motors Corp.—**James E. Goodman** was recently elected a vice president.

Curtiss-Wright Corp.—**Raymond R. Leonard** and **David Grimshaw** have been named manager and assistant manager, respectively, of a new spare parts section in the Aeronautical Sales Dept.

White Motor Co.—**Earl H. Lewis** is now manager of sales training, while **E. S. Hoke** succeeds him as assistant to the vice president in charge of sales.

Illinois Tool Works, Shakeproof, Inc., Div.—**William B. Denniston** is now manager of distributor sales. **Walter E. Hanneman** and **V. A. Hedlund** have been chosen executive engineer and special service engineer, respectively.

Tinnerman Products, Inc.—**Chris Ringhaver, Thomas M. Landfear,** and **Herman H. Welland** have been appointed sales managers for the district offices in Chicago, Ill., Rochester, N. Y., and Cincinnati, O., in that order.

Westinghouse Electric Corp.—**James R. Weaver** is now assistant to the vice president in charge of manufacturing.

National Tool Co.—**Richard S. Huxtable** was recently elected a director.

Hupp Corp., Amgears Div.—**M. F. Frankel** is now manufacturing director.

Ohio Crankshaft Co.—**Foster H. Pettay** and **Chester H. Kimmel** have been elected vice presidents.

Libbey-Owens-Ford Glass Co., Fiber Glass Div.—**Robert O. Bradley** has been named industrial engineer for the new factory.

E. W. Bliss Co., Hastings, Mich., Div.—**Robert Shannon** has been chosen manager.

Chrysler Corp.—**John E. Carmichael** is now director of personnel and employee relations at the Delaware Tank Plant.

The hole idea is to save you steel ... *and machining time!*

IF you're a hollow parts manufacturer, here's an idea that will help you save steel and cut production costs, too: Use Timken® seamless steel tubing instead of bar stock!

With Timken seamless tubing, the center hole is already there. There's less scrap loss because there's less metal to be machined away. You get more parts per ton of steel.

Timken seamless tubing also helps make your machine tools more productive. Drilling is eliminated and finish boring is often your first production step. Screw machine stations are released for other operations. You get more machining capacity without adding machines.

You get better quality in your product, too! The piercing process by which Timken seamless tubing is made is basically a forging operation. The tubing has a uniform spiral grain flow for greater strength and a refined grain structure which brings out the best in the quality of the metal. And the Timken Company's rigid quality control insures uniformity from tube to tube and heat to heat.

TUBE ENGINEERING Service. To help you save even *more* steel, the Timken Company offers a tube engineering service which recommends the most economical tube size for your job—guaranteed to clean up.

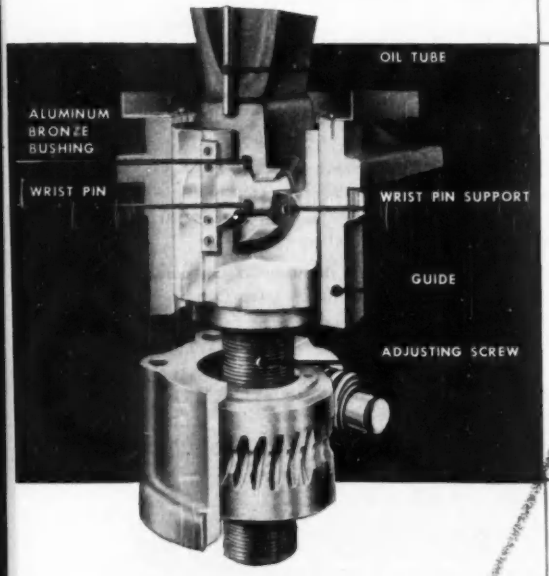
For further information on the use of Timken seamless tubing, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

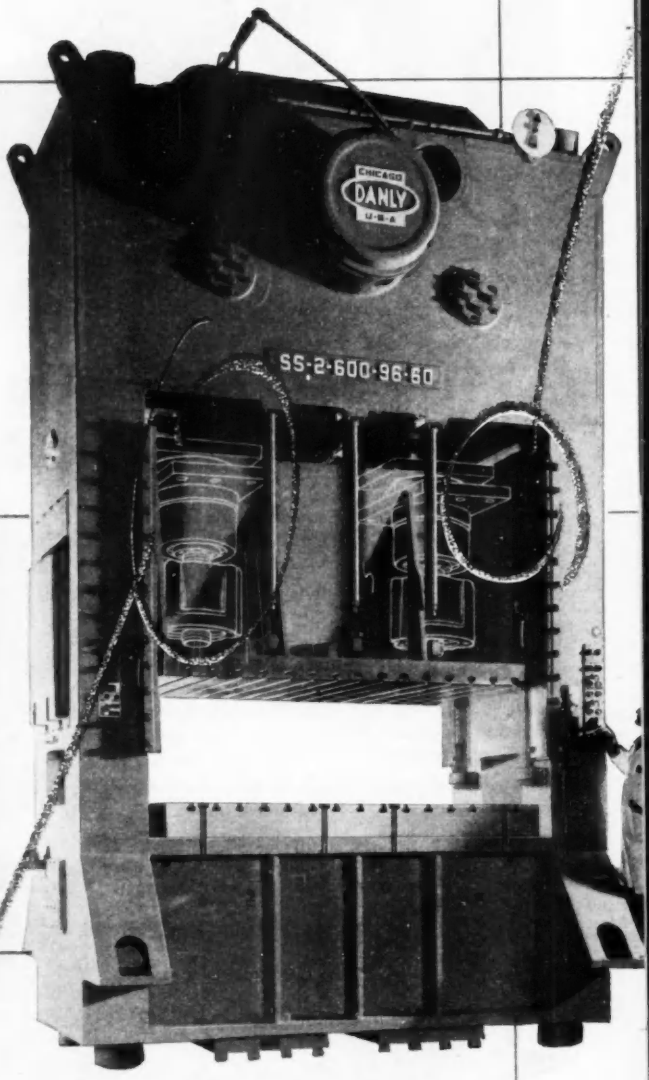
YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

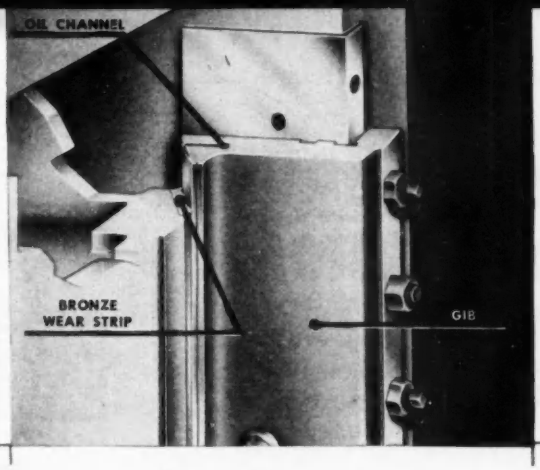
when you buy presses...

Slide Adjustment Mechanism illustrates how Danly design gives intermediate support to heat treated and ground wrist pin, eliminating bending stress under load. Upper assembly is retained within vertical guides permitting the use of extra long adjustments because there is full strength at extended settings. The construction shown, plus automatic *oil* lubrication, makes practicable the use of close machine fits at the wrist pin joint. This is Danly construction.





A Danly 600 ton Single Action, Straight Side Press equipped with automatic *oil* lubrication—including gibs.



Cutaway of Gib Construction shows how *oil* is supplied to gibs. Automatic oil lubrication of the gibs, permitting extremely close alignment of the slide, is standard on most models and available on all Danly presses. Extra long gibs entirely contain slide during working stroke, prolonging die life. This is Danly construction.

take a close look at construction

Extra strength and precision will save you both production time and money. Dies will last longer, stamped parts will meet closer tolerance requirements and press down time will be reduced.

Construction features like those shown here—plus specially engineered controls and the exclusive Danly Cool-Running Clutch—are reasons why industrial leaders throughout the country are choosing . . .

DANLY PRESSES

Danly's complete engineering staff is at your service to help you select the best presses for your job. Write today—and ask for the Danly Straight Side Press Catalog.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois

It costs less to run a DANLY PRESS!

Single Action Straight Side | Autofeed | Underdrive Single, Double, Triple Action | Gap Frame | Double Action Straight Side

DANLY

MECHANICAL PRESSES . . . 50 TO 3000 TONS
HYDRAULIC METALWORKING EQUIPMENT

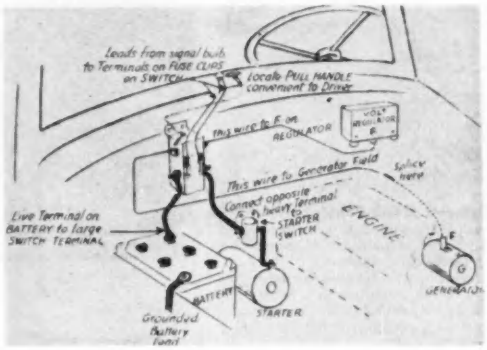
New Products

For additional information please use postage-free reply card on page 65

(Continued from page 64)

Short-Circuit Indicator

A device to prevent fires resulting from short circuits in trucks, buses and cars has been introduced. Known as the Mak-Saf switch it disconnects the battery during storage period of vehicle, disconnects generator in road emergency, and automatically indicates short circuits.


Leads from signal bulb to Terminals on FUSE CLIPS on SWITCH
Locate PULL HANDLE convenient to Driver
This wire to F on REGULATOR
This wire to Generator Field
Splice here
Connect opposite F to heavy terminal
STARTER SWITCH
ENGINE
Live Terminal on BATTERY to large SWITCH TERMINAL
BATTERY
STARTER
Grounded Battery Lead

Rochester short-circuit indicator, the Mak-Saf

Mak-Saf mounts on fire wall of any vehicle and is connected to dashboard by means of flexible cable. Pulling out the handle breaks the electrical circuit. Any leakage that might occur after handle is pulled is limited to less than ¼ amp.

Signal light, located above handle on dash, lights when ignition switch or any accessory has been left in operation. It will also light when there is short circuit in unprotected wiring. Light shuts off when short circuit has been repaired. Mak-Saf gives driver manual control of generator at all times. *Rochester Mfg. Co.*

Circle P-8 on page 65 for more data

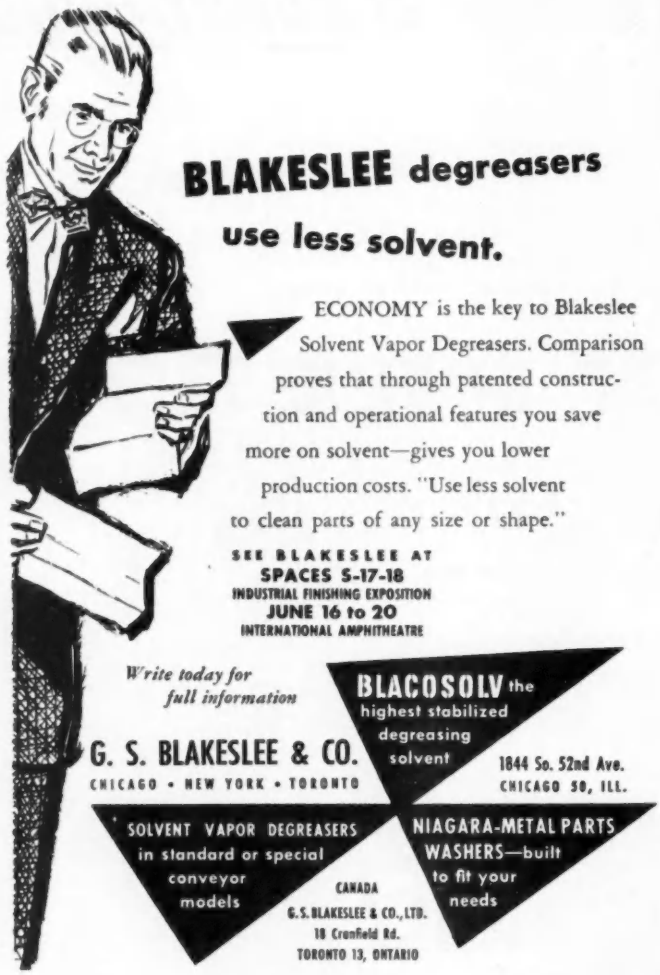
Automotive Cooling System Protector

An automobile accessory recently put out protects cooling systems against scale and corrosion by softening the water with ion exchange resins. This unit, an approved accessory for Studebaker cars and trucks, is a reduced-size version of much larger water-treatment installations used in industry and in the home.

The heart of the automotive water softener, produced by the Fram Corp., is a replaceable cartridge. The cartridge, which is inserted in an outer sheet-metal container, consists of two components: (1) A plastic-reinforced paper shell that filters out particles of rust and dirt from the cooling system; (2) a porous cloth sack containing a two-ounce charge of Amberlite IR-120 ion exchange resin plus a corrosion inhibitor.

Circulating coolant water, bypassed from the main stream of the heater line, enters the top of the unit and flows into the sack containing the

(Turn to page 118, please)


BLAKESLEE degreasers use less solvent.
ECONOMY is the key to Blakeslee Solvent Vapor Degreasers. Comparison proves that through patented construction and operational features you save more on solvent—gives you lower production costs. "Use less solvent to clean parts of any size or shape."
SEE BLAKESLEE AT
SPACES S-17-18
INDUSTRIAL FINISHING EXPOSITION
JUNE 16 to 20
INTERNATIONAL AMPHITHEATRE
Write today for full information
BLACOSOLV the highest stabilized degreasing solvent
G. S. BLAKESLEE & CO.
CHICAGO • NEW YORK • TORONTO
1844 So. 52nd Ave.
CHICAGO 50, ILL.
SOLVENT VAPOR DEGREASERS in standard or special conveyor models
NIAGARA-METAL PARTS WASHERS—built to fit your needs
CANADA
G.S. BLAKESLEE & CO., LTD.
18 Cranfield Rd.
TORONTO 13, ONTARIO

BullDog Reduces Pushmatic Prices

You save up to 35% on genuine Pushmatic Circuit Breakers, Electri-Centers, Accessories.

Now, all Pushmatic prices have been drastically reduced!

There has been no sacrifice in quality, no change whatsoever in the products. You save up to 35% on genuine Pushmatic® Circuit Breakers, Electri-Centers and Accessories. Get all the well-known Pushmatic advantages at the price of ordinary circuit-breaker equipment.

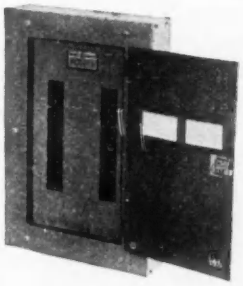
Popular demand, new production facilities make this reduction possible. A new BullDog plant (Bellefontaine, Ohio) is devoted exclusively to producing the Pushmatic line. Production is up, costs down . . . you share in the savings when you buy Pushmatic.

No need to let price make you settle for second best. Check the convenience, flexibility and all the top-quality features of Pushmatic Electri-Centers at your local BullDog supplier's, or write for descriptive bulletin. Compare the *new low price.*

Just push the button!

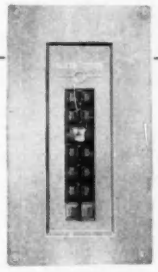
Famous, Foolproof Pushmatic
Circuit Breakers are individual, interchangeable units that provide automatic, trip-free circuit protection always. Rupture circuits instantly when trouble occurs. Need no resetting. Just a simple push restores service. Available in 15, 20, 30, 40 & 50 Amps. Install quickly, simply . . . give unmatched flexibility to BullDog Electri-Centers. Guaranteed. Listed by Underwriters'.

New low price!



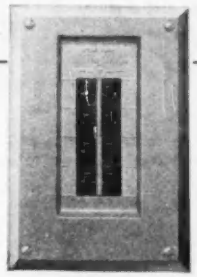
P2B Electri-Centers
with Pushmatics. Fully flexible, adapt to *any* job, on the job . . . available in minutes from local suppliers' stocks. Up to 42 circuits.

New low price!



XD Electri-Centers
for homes, small businesses. Feature split bus bars, Pushmatic protection, *one* central control for all home circuits. Accommodate up to 18 circuits.

New low price!



Service Electri-Centers
also equipped with modern, safe Pushmatic Circuit Breakers. Adapt quickly, easily to present, future needs. Eliminate fuses. Up to 8 circuits.

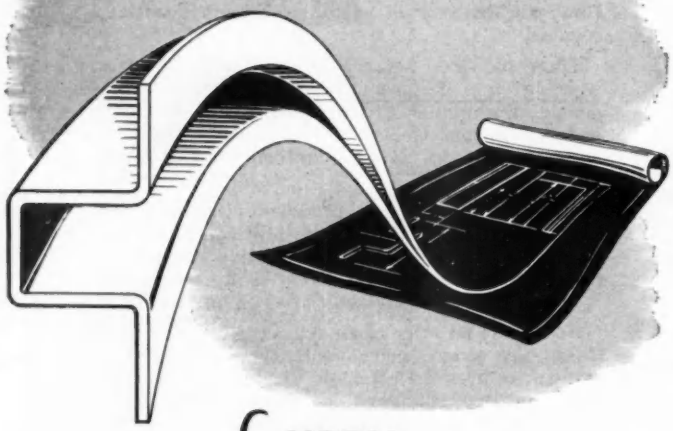
New low price!

BULLDOG

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO
PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS

1902-1952 . . . SERVING INDUSTRY FOR 50 YEARS WITH FINER ELECTRICAL PRODUCTS

Now BATH WILL STRETCH-FORM your intricate metal shapes



Any { METAL CROSS-SECTION QUANTITY

Complex metal shapes required by modern aircraft production can be stretch-formed to exacting tolerances. Jet flange rings, shrouds, cases, flame tubes, stiffeners and casings in either full circles or segments can be produced from the new tough alloys developed for jet aircraft.

In addition, Bath stretch-forming technique provides increased strength with reduced weight. Forming single or compound curves, constant or varying radii, and bends of more than 360°, this process produces complex parts in single piece.

Let Bath's 10-years' experience in forming aircraft components aid you in the production of difficult parts. Send blueprints and quantity requirements for free estimate.

504-CY

THE CYRIL BATH COMPANY

6915 Machinery Avenue • Cleveland 3, Ohio

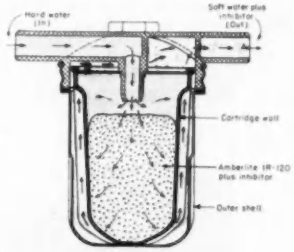
New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 116)

exchanger-inhibitor mixture. There, the water is softened as the resin extracts the dissolved scale-producing materials by chemical reaction. During the process the water picks up the corrosion inhibitor, passes through the fine-pored walls of the cartridge, where particles of rust and scale are filtered out, and returns to the cooling system. The flow through the unit is 24 quarts per hour at road speeds of 30-40 mph. Because the bypass arrangement permits only one-tenth of the total heater flow to enter the softener, water circulation can never be materially impaired.

The materials in the exchanger sack keep the cooling system at the level of alkalinity most favorable for



Rohm & Haas cooling system protector.

inhibiting corrosion. Moreover, this level is said to be maintained regardless of initial quality of the water.

The Amberlite exchanger is compatible with standard anti-freeze materials and rust inhibitors, including the soluble oil type inhibitor, used in automotive cooling systems. Moreover, the resin shows no physical or chemical degradation from heated coolant even after prolonged engine operation.

The two-ounce charge of resin in the cartridge has the capacity to completely soften four gal of water having 30 grains of hardness. To prevent loss of softener efficiency from the accumulation of rust and scale on the porous cartridge surface, the manufacturer recommends that the cartridge be replaced twice a year. *Rohm & Haas Co.*

Circle P-9 on page 65 for more data

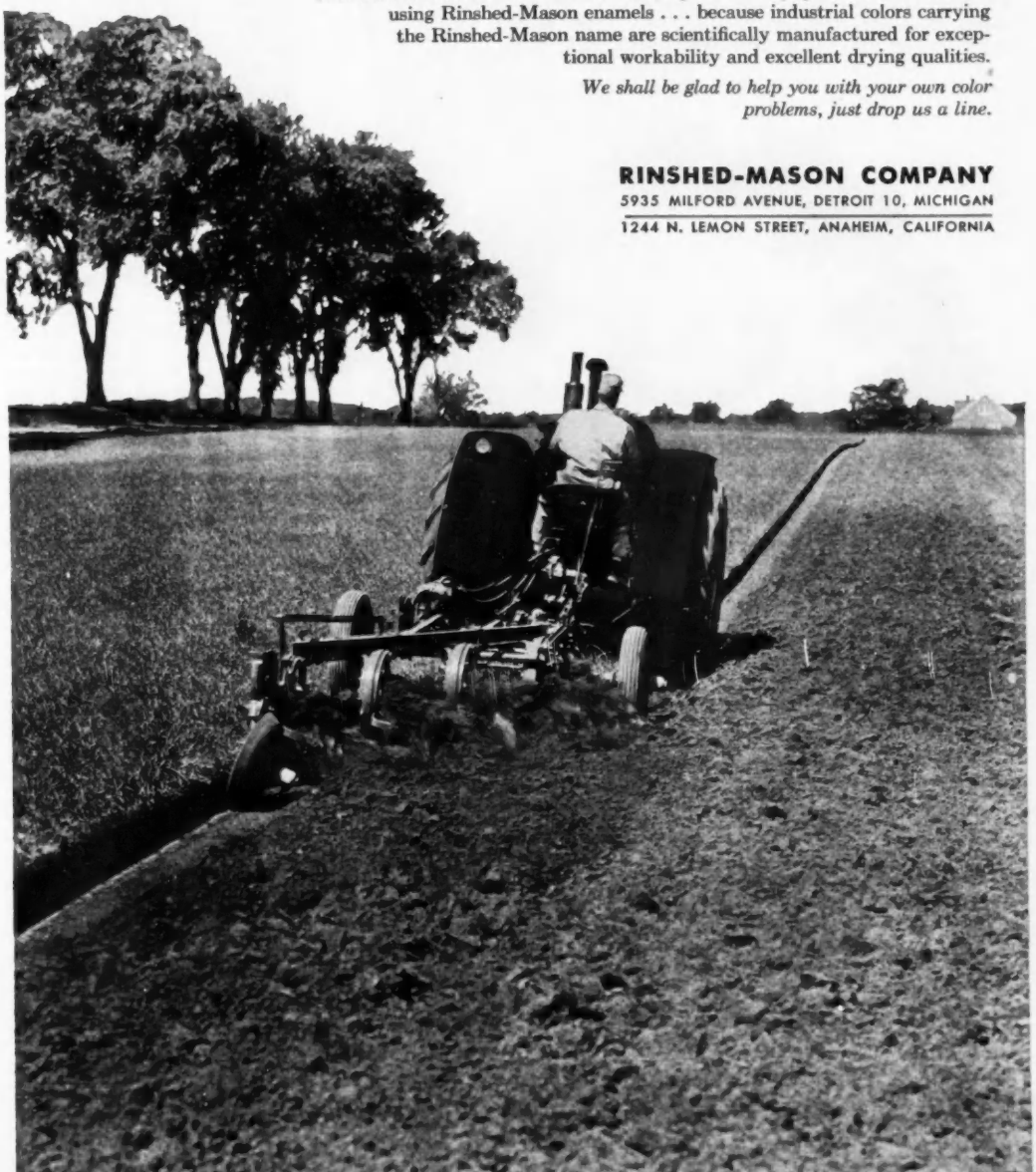
(*Turn to page* 120, *please*)

Why J. I. Case finishes farm tractors with RINSHED-MASON ENAMEL

J. I. Case is another one of the world's largest farm equipment manufacturers using Rinshed-Mason enamels . . . because industrial colors carrying the Rinshed-Mason name are scientifically manufactured for exceptional workability and excellent drying qualities.

We shall be glad to help you with your own color problems, just drop us a line.

RINSHED-MASON COMPANY
5935 MILFORD AVENUE, DETROIT 10, MICHIGAN
1244 N. LEMON STREET, ANAHEIM, CALIFORNIA



Write today for your copy of a specially prepared U. S. Government Specification Finishes brochure.

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 118)

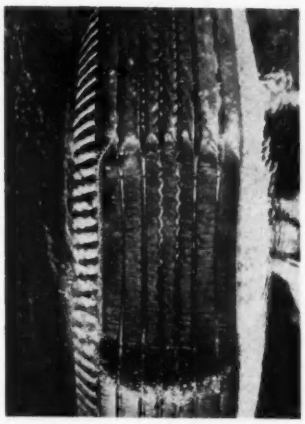
Tubeless Tire

Recently developed is a tubeless tire which is said to defy skidding on wet pavements, shorten stopping distances on ice and give up to 15 per cent added passenger car tire mileage.

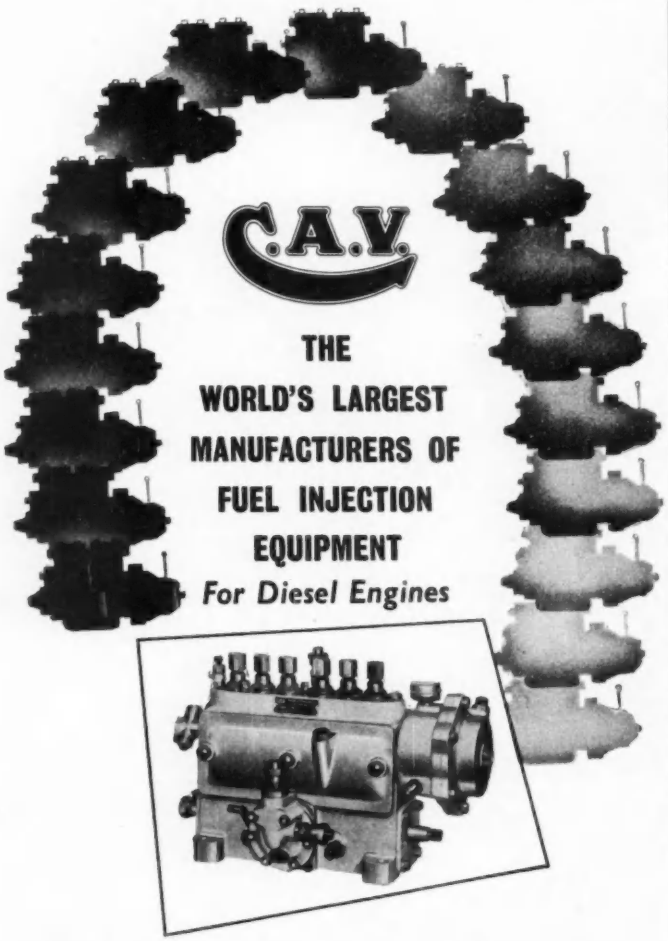
The tread design consists of more than 10,000 tiny blocks of rubber each 0.0625 in. wide and approximately ¼ in. deep.

Goodrich engineers claim that when brakes are applied the blocks act like fingers and grip a wet surface wiping it dry. When the tire is rolling, the blocks exert a walking motion, a factor which increases tire mileage. The tire is available in all popular low-pressure sizes. *B. F. Goodrich Co.*

Circle P-10 on page 65 for more data



Goodrich tubeless tire.



C.A.V.

Fuel Injection and Electrical Equipment

Depots and Service Agents in over 100 countries

C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES INC., 653, TENTH AVENUE, NEW YORK 19, N.Y.
Sales Office: 14820 DETROIT AVENUE, CLEVELAND 7, OHIO

174-479

Bright Metal Protective Coating

Now being marketed is an anti-rust coating—trademarked Corogard chrome coating. It is a transparent liquid for use on bumpers, grilles, metal mouldings and similar bright metals, either chrome metal or stainless steel.

It is said to resist weathering without discoloring, withstands car washing, and has excellent resistance to salt water spray, salt-treated winter streets, and extremes of temperature. *Minnesota Mining and Manufacturing.*

Circle P-11 on page 65 for more data

Automobile Brake

A recently developed Safety Brake for automobiles employs a floating brake backing plate mounted to a bearing on the rear axle housing. An arm attached to the backing plate with a link at its outer end is connected to the frame side rail. The rotational force created by the brake drum causes the backing plate to rotate when the brakes are applied, thus moving the arm downward and exerting a downward pull on the frame through the connecting link. Through this application of existing forces in braking, the tendency of the car to pivot about the front axle, or to pitch the passengers forward, is said to be eliminated.

The stabilizing action of this brake is claimed to prevent pitch of the rear end of the car on severe brake applications. *Monroe Auto Equipment Co.*

Circle P-12 on page 65 for more data

(*Turn to page* 122, *please*)

INSIGNIA OF QUALITY

This emblem symbolizes the fundamental strength behind the seven modern Dee-Gee plants—producing a wide range of industrial products. • Long famous for highest quality gaskets, Dee-Gee also meets the most exacting demands for fabricated parts, glazing tapes, dash insulators, sun visors and glove compartments, aluminum extrusions and brass rods. • Complete research and engineering departments are available at all times to assist with your production problems.

DETROIT GASKET & MANUFACTURING COMPANY

DETROIT 23, MICHIGAN

Sub-surface defects are quickly discovered with the Sperry Reflectoscope in the Grumman Aircraft Engineering Corp. plant.

SPERRY ULTRASONICS

INSURE QUALITY AND SAFETY

Large aluminum alloy forgings being tested after partial machining.

Critical areas of stress fittings being sonic tested.

Without quality there is no safety wherever metal parts are under stress. To insure the high quality of all components Grumman Aircraft Engineering Corporation uses Sperry Reflectoscopes to test raw materials and manufactured parts used in their famous planes.

The Sperry Ultrasonic Reflectoscope is the most modern non-destructive instrument for on-the-spot testing of metals for the detection of defects. Not only are many hours of machining saved but manufacturers are assured that no hidden flaws exist to cause later failure.

Practically every type of metal can be quickly and accurately inspected with the Sperry Reflectoscope. Parts may be checked without dismantling at great time saving to industry.

Write for complete descriptive information on the Sperry Day-to-Day Inspection Service or ask for particulars covering the lease or sale of the Sperry Ultrasonic Reflectoscope.

SPERRY PRODUCTS, INC.
206 SHELTER ROCK ROAD
Danbury, Connecticut
REPRESENTATIVES IN PRINCIPAL CITIES

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 120)

Directional Signals

A series of Class A directional signal lamps, that includes a two-face lamp of new design, are being manufactured. The two-face lamp is two inches wide and operates on a single bulb. A special Stimsonite lens provides 12 sq in. of lighting surface.

The entire 600 Series, as it is called, includes the two-face lamp finished in black enamel with chrome bars on each side, a single-face pedestal lamp, a semi-flush stud-mounted lamp and a full-flush lamp. They can be supplied in six separate combinations, each lamp complete with self-cancelling switch. *Sparton Automotive.*

Circle P-13 on page 65 for more data

Spartan two-face directional signal

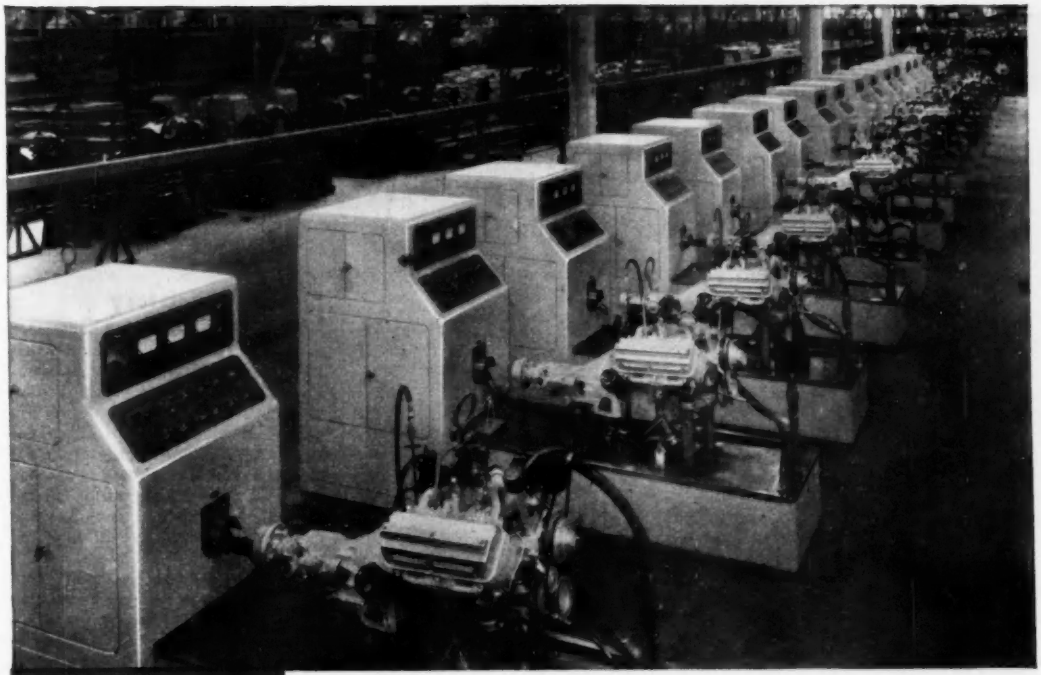
Brazing Material

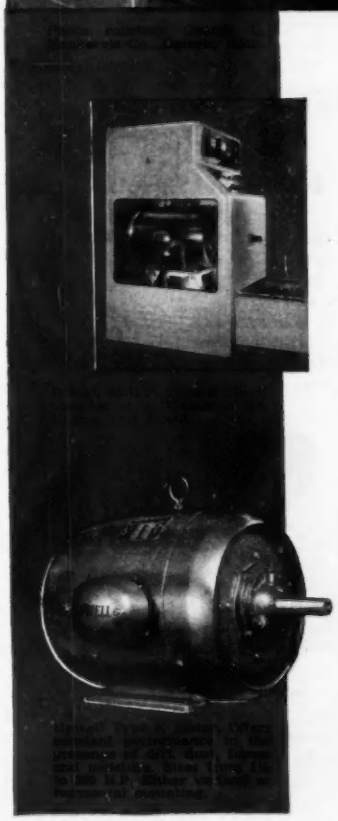
Brazinal, a product for brazing aluminum and its alloys, without fluxes, has been put on the market. Properties of this material are as follows: Melting point 880 F, tensile strength 45,000 psi, and Brinell hardness number 80. The process features excellent corrosion resistance in salt spray test, in acid conditions and in high humidity atmospheres. It is said to minimize warpage.

Brazinal is available in triangular rod in several sizes. It is supplied in lengths of 12 in., 16 in., and 18 in. *A. E. Ulmann & Associates, Ltd.*

Circle P-14 on page 65 for more data

(*Turn to page* 124, *please*)





New test stand proves performance before engine meets chassis!

In these Nankervis Hot Engine Test Stands, installed in one of the country's newest automotive engine plants, 40-H.P. Howell Motors act as the test load for new engines. It's an unusual application for electric motors, but Howell Motors handle the job easily.

Here, inefficient engine operation from poor carburetion, timing, ignition, etc., is detected immediately when horsepower does not reach prescribed standards. Faulty parts can be quickly replaced or adjustments made while the engine is still on the stand.

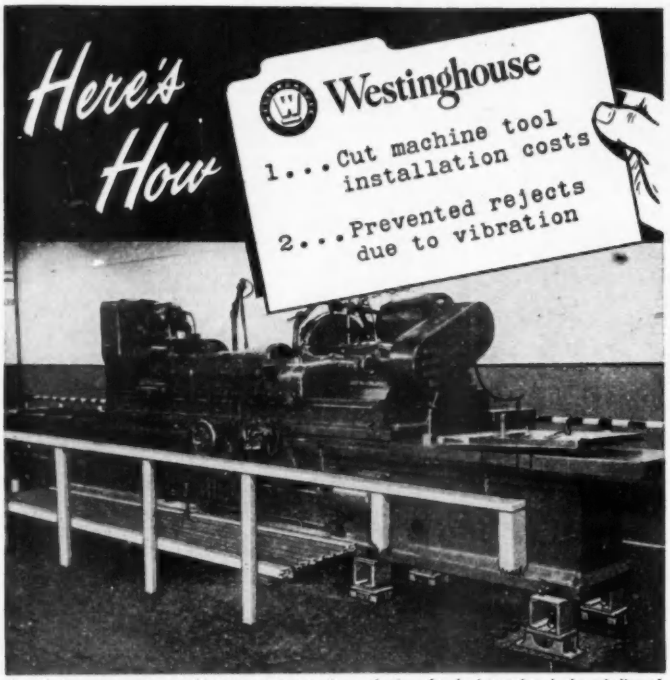
Testing procedures like this one make special demands on the electric motors. Highest accuracy is a must. Howell Motors' superior design, quality materials and precision construction assure the performance necessary for exacting operations.

You, too, can benefit by using Howell engineering services and precision-built Howell Motors from 1/6 to 250 H.P. in standard NEMA frame sizes. Howell Motors do your tough jobs better, and at the same time give you economy through long life and trouble-free operation. It will pay you to contact the Howell representative in your city or write to us today.

HOWELL Red Band MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Precision-built industrial motors since 1915



One of the most exacting machining operations in the production of turbo-jet engines is the grinding of compressor rotors in the Kansas City plant of the Aviation Gas Turbine Division of Westinghouse Electric Corporation. Two 24" x 96" Norton cylindrical grinders are mounted, as shown above, directly on Korfund Steel Spring Vibro-Isolators without the usual massive foundations. These grinders are 19' 6" long and weigh 27,200# each.

...by protecting grinder accuracy against external vibration

Extremely close tolerances required for compressor rotors made it necessary for Westinghouse to isolate their cylindrical grinders from heavy external truck vibration.

Conventional foundations would have required an excavation through the existing floor 7 ft. wide by 22 ft. long by 4½ ft. deep—with over 20 cubic yards of concrete weighing approximately 80,000 lbs.—for each grinder.

In contrast to this, Korfund Steel Spring Isolators permitted installation of the grinders directly on the existing concrete floor after simply removing the wood block to help reduce the height of the installation.

Tests made after the installation was completed—in which the isolators were "short circuited" out—demonstrated that it would have been impossible to do accurate work on the grinder without Korfund Vibration Control. Rigid alignment of work and grinding head is maintained, as proven by the fact that during the first two years of operation, no adjustments have been required.

Korfund Isolators more than paid for themselves in reduced foundation costs alone.

If you would like more information on how Korfund Vibration Control can save you money and increase production, write for your free copy of "Steel-Spring-Type Vibration Mountings for Machine Tools." Also, a selector chart in Bulletin G-104 gives recommendations for both normal and critical installations—for machine tools, presses, hammers, pumps, compressors and most other types of mechanical equipment. See Sweet's Catalog Files, or write us for your free copy today.

We'll gladly submit recommendations without obligation. Just contact us, or the Korfund representative you'll find in most principal cities. A half century of experience is at your disposal.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

THE KORFUND COMPANY, INC.

48-02A Thirty Second Place - Long Island City 1, N. Y
In Canada: 2040 Victoria St., Montreal 2

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 122)

Plastic Upholstery

Fabric-like textures and multi-color prints are being featured in the Col-O-Vin line of vinyl plastic upholstery. Florentine, reproduced from Italian upholstery cloth, is one of the maker's texturized numbers with light-and-shadow effects that emphasize the design and texture. Jacquard is another embossed pattern reproducing an interesting fabric weave. Both of these texturized patterns are in stock in seven colors.

Libra is one of the multi-color prints available in four color combinations; it has a textured finish. Starburst is still another Col-O-Vin number with a design that suggests its name. A feature of these texturized patterns and prints is the wide selection of upholstery colors. *Columbus Coated Fabrics Corp.*

Circle P-15 on page 65 for more data

Directional Signals

A complete line of Class A Type I directional signal sets that comply with all state laws and regulations for directional signal systems is on the market.

The complete Class A Type I line consists of seven sets for all types of the vehicular mountings. A double face fender lamp with amber and red

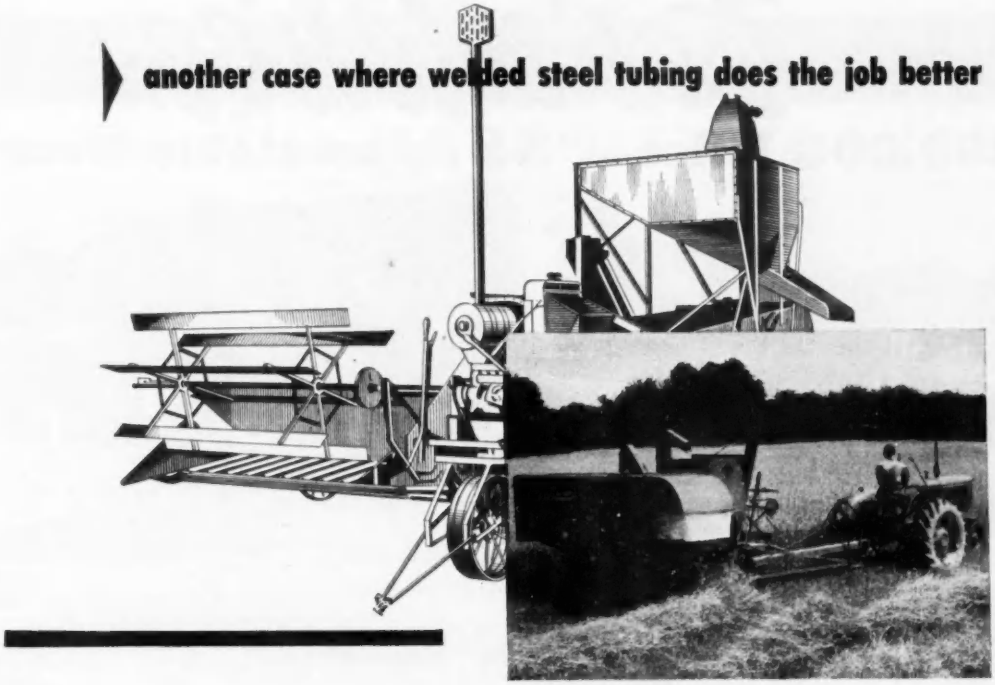
Yankee directional signals.

lens is the newest type of directional signal lamp for use on trailers of over 80-in. in width.

Four basic lamps comprise the seven stock combinations. Every set is complete with switch, flasher, fuses, wire, hardware and installation instructions. Any set is available for either, six, eight or 12 v systems. *Yankee Metal Products Corp.*

Circle P-16 on page 65 for more data

another case where welded steel tubing does the job better



ELECTRUNITE Steel Tubing made this farm equipment better at lower cost . . .

it can do the same for you . . .

Unnecessary dead weight was lopped off in hundred-pound chunks without reducing strength when a leading farm implement manufacturer designed his line to use Republic ELECTRUNITE Steel Tubing at every possible point.

Strength and shock resistance were increased because Republic ELECTRUNITE Steel Tubing provided maximum strength per pound of metal over ordinary conventional shapes. Troublesome torsion and weaving of implements on rough ground was cut drastically . . . useful life of the implements was greatly lengthened, and maintenance reduced.

Does this give you some ideas about *your* product . . . whatever it may be? Republic ELECTRUNITE Steel Tubing can keep your product strong yet make it lighter, make it better at lower cost, more attractive to the man who uses it . . . and who buys it. We'd like to tell you our ideas.

Republic ELECTRUNITE TUBING

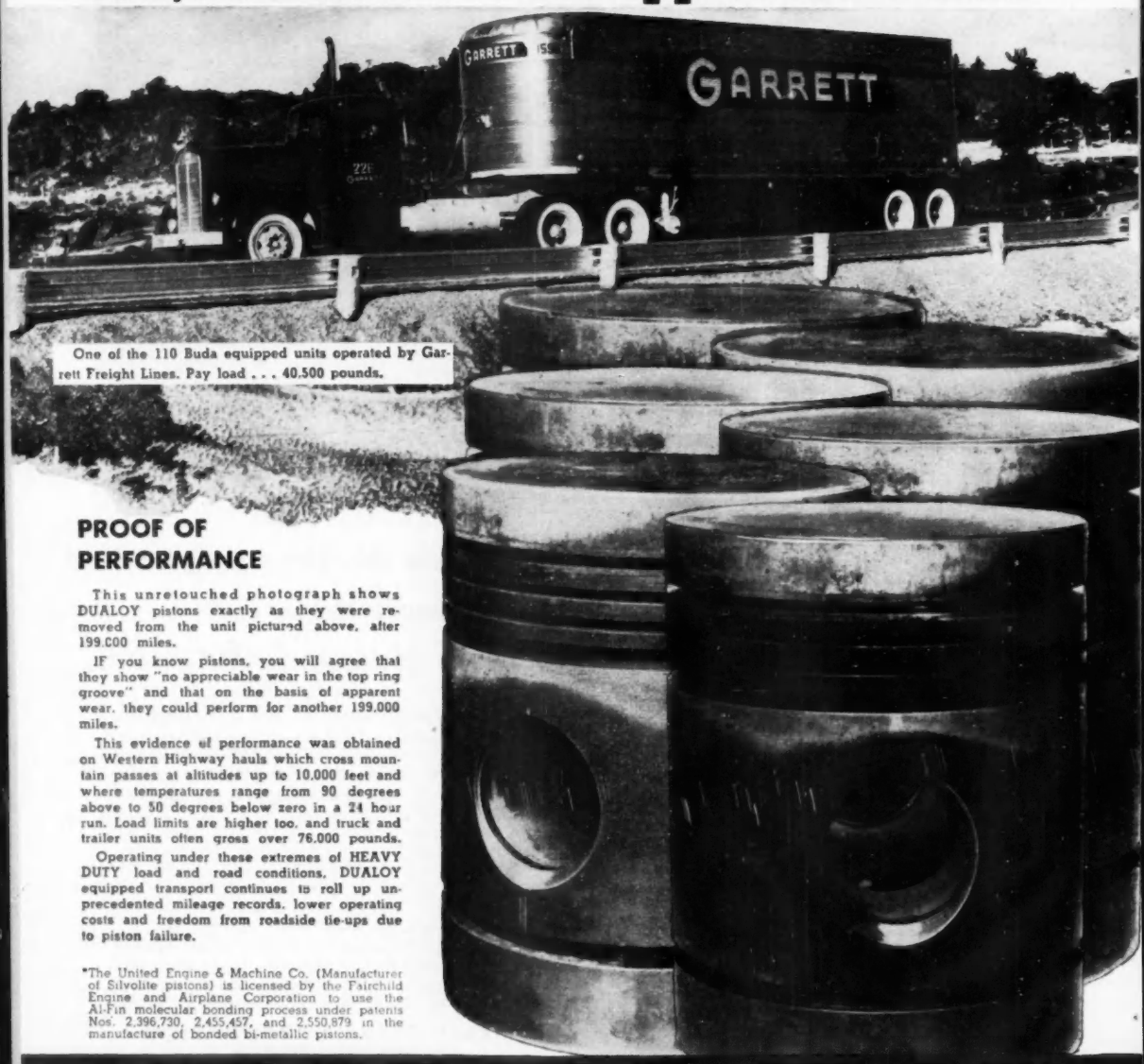
REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION
224 EAST 131st STREET • CLEVELAND 8, OHIO

Made by the producers of ELECTRUNITE The "Original" ELECTRIC-WELDED BOILER TUBE

FREE BOOKLET—*Write for Booklet SPD-52 . . . contains data and case histories on* ELECTRUNITE *Tubing applications.*

Evidence

199,000 Miles—"No Appreciable Wear"



One of the 110 Buda equipped units operated by Garrett Freight Lines. Pay load . . . 40,500 pounds.

PROOF OF PERFORMANCE

This unretouched photograph shows DUALOY pistons exactly as they were removed from the unit pictured above, after 199,000 miles.

IF you know pistons, you will agree that they show "no appreciable wear in the top ring groove" and that on the basis of apparent wear, they could perform for another 199,000 miles.

This evidence of performance was obtained on Western Highway hauls which cross mountain passes at altitudes up to 10,000 feet and where temperatures range from 90 degrees above to 50 degrees below zero in a 24 hour run. Load limits are higher too, and truck and trailer units often gross over 76,000 pounds.

Operating under these extremes of HEAVY DUTY load and road conditions, DUALOY equipped transport continues to roll up unprecedented mileage records, lower operating costs and freedom from roadside tie-ups due to piston failure.

*The United Engine & Machine Co. (Manufacturer of Silvolite pistons) is licensed by the Fairchild Engine and Airplane Corporation to use the Al-Fin molecular bonding process under patents Nos. 2,396,730, 2,455,457, and 2,550,879 in the manufacture of bonded bi-metallic pistons.

DUALOY

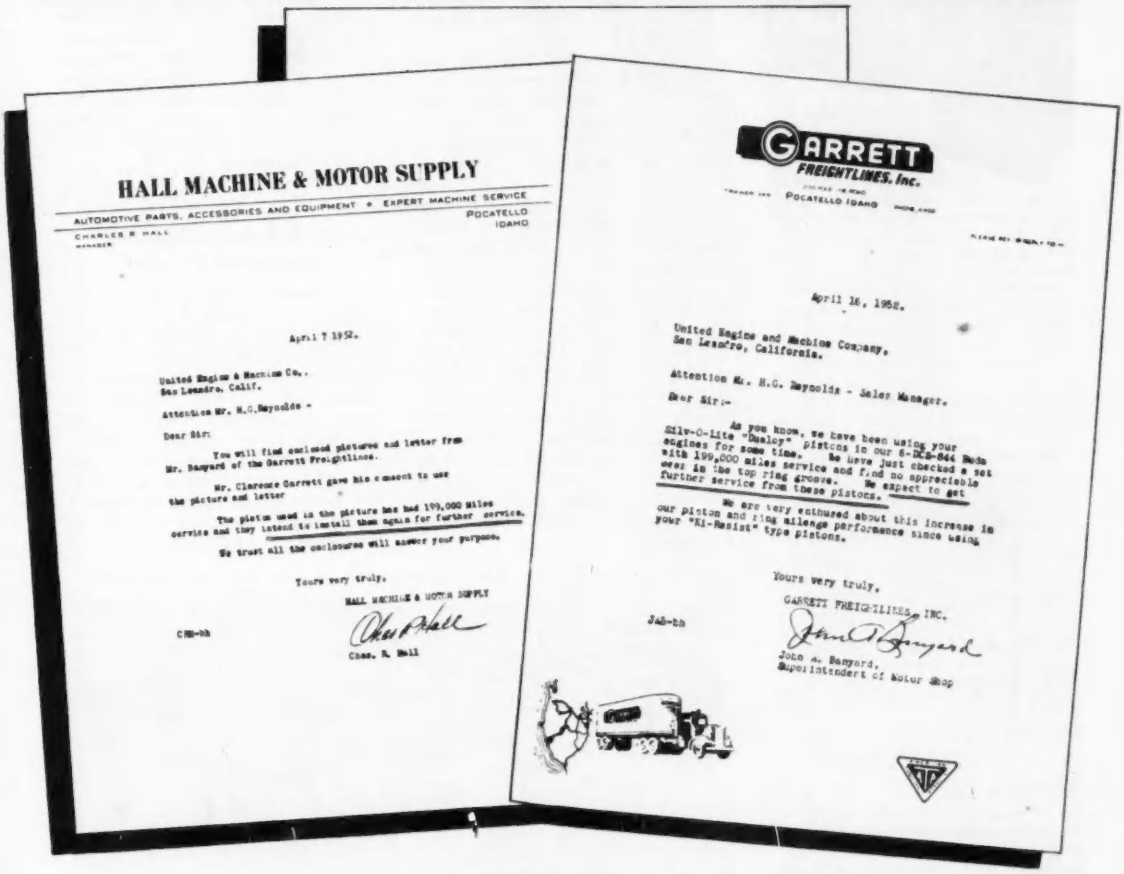
THE 1st BI-METALLIC MOLECULAR BONDED PISTON

UNITED ENGINE AND MACHINE COMPANY

310 PREDA STREET · SAN LEANDRO, CALIFORNIA

Verdict

Sentenced to MORE HARD LABOR



HALL MACHINE & MOTOR SUPPLY

AUTOMOTIVE PARTS, ACCESSORIES AND EQUIPMENT • EXPERT MACHINE SERVICE

CHARLES R. HALL, MANAGER — POCATELLO, IDAHO

April 7 1952.

United Engine & Machine Co.,
San Leandro, Calif.

Attention Mr. H.G.Reynolds -

Dear Sir:

You will find enclosed pictures and letter from Mr. Bangard of the Garrett Freightlines.

Mr. Clarence Garrett gave his consent to use the picture and letter

The piston used in the picture has had 199,000 Miles service and they intend to install them again for further service.

We trust all the enclosures will answer your purpose.

Yours very truly,

HALL MACHINE & MOTOR SUPPLY

CRH-bh

Chas. R. Hall

GARRETT FREIGHTLINES, Inc.

POCATELLO IDAHO

April 16, 1952.

United Engine and Machine Company,
San Leandro, California.

Attention Mr. H.G. Reynolds - Sales Manager.

Dear Sir:-

As you know, we have been using your Silv-O-Lite "Dualoy" pistons in our 6-DCB-844 Hudson engines for some time. We have just checked a set with 199,000 miles service and find no appreciable wear in the top ring groove. We expect to get further service from these pistons.

We are very enthused about this increase in our piston and ring mileage performance since using your "Ni-Resist" type pistons.

Yours very truly,

GARRETT FREIGHTLINES, INC.

JAB-bh

John A. Bangard,
Superintendent of Motor Shop

OVER 715 BILLION TON MILES IN 1951

377,888 Tons of Pay-load moved for a total of 18,980,602 miles in Interstate and Intercity commerce during 1951.

Garrett operates a fleet of 738 Diesels. 423 of these units are highway units, 315 are engaged in local and intra-city pick-up. The impressive figure above is exclusive of all local activity by the 315 units.

DUALOY is proud to participate in Garrett's outstanding record of highly efficient and low cost operation.

Specify Dualoy — the piston of proven performance with the bonded Niresist iron insert.

DUALOY

THE ONLY Ni-RESIST INSERT BONDED PISTON

UNITED ENGINE AND MACHINE COMPANY

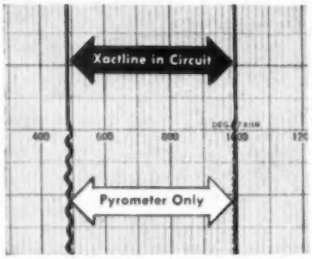
310 PREDA STREET · SAN LEANDRO, CALIFORNIA

Automatic
"STRAIGHT-LINE"
TEMPERATURE CONTROL
with
XACTLINE

ELIMINATE
Overshooting
Undershooting

Are you going to continue to put up with that troublesome overshooting and undershooting inherent in your conventional pyrometer control—especially when it is so easy to eliminate that saw-tooth effect?

Put XACTLINE in the control circuit. XACTLINE anticipates the temperature changes—before they occur. And too, it nullifies the varying amounts of thermal lag, residual heat, and mechanical lag—producing a short on-off cycle resulting in "Straight-Line" temperature control. This performance is possible because there is no dependence upon mechanical parts—XACTLINE operates electrically.



Exact reproduction of temperature chart for a heating process showing the comparison of the "Straight-Line" temperature control produced by XACTLINE and the saw-tooth curve obtained with only conventional control.

XACTLINE is applicable to any indicating or recording pyrometer control of the millivoltmeter or potentiometer type. It should be used wherever close temperature control is required—any type of electrically heated oven, furnace, kiln, injection molding machine, and fuel-fired furnaces equipped with motor-operated or solenoid valves.

XACTLINE is a complete unit. No adjustment or coordination with the control instrument is required regardless of the size of the furnace, length of the heating cycle, or size of the load. Installation is very simple—can be either flush or surface mounted.

PRICE $89.50 F.O.B. CHICAGO
Nothing else to Buy

GORDON SERVICE

CLAUD S. GORDON CO.
Manufacturers & Distributors
Thermocouple Supplies • Industrial Furnaces & Ovens
Pyrometers & Controls • Metallurgical Testing Machines
Dept. 13 • 3000 South Wallace St., Chicago 16, Ill.
Dept. 13 • 2035 Hamilton Ave., Cleveland 14, Ohio

Hydraulic Press

(*Continued from page 56*)

Press will be offered in two types:

(1) A given size with duplex fast-acting tables, automatic controls and interlocks. This press would be well suited for high production.

(2) Single manual table and controls, slower press operation at a much lower price. This arrangement would be adequate for die tryout, experimental operation, maintenance repair, or for use by the small subcontractor.

The type of construction (split halves) used on the prototype limited the width to 20 in. when employing six in. laminations. The solid "donut" or "shell" type of construction which will be employed on the production presses does not have this limitation. The width is critical only from a material cost standpoint as this will vary as to the square of the width ratios. The length factor is not critical, and the material and cost will bear a slightly less than linear relationship.

The Wheelon press will be manufactured and marketed, under license, by the Verson Allsteel Press Co. of Chicago.

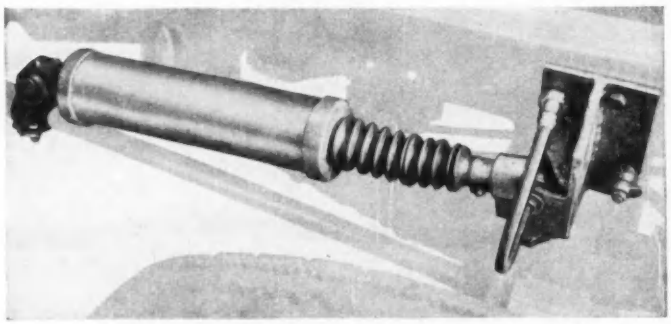
Solar Aircraft Sales Reach $51 Million

Solar Aircraft Co.'s unaudited sales for the fiscal year ended April 30 exceeded $51 million, nearly double the sales of $25,575,925 in the fiscal year ended April 30, 1951.

While the bulk of Solar's sales are accounted for by military aircraft items such as jet and piston engine components, afterburners, exhaust systems, and other high temperature metal products, indicated output of non-aircraft civilian items is also increasing.

ASBE Technical Meeting Slated for October

The American Society of Body Engineers has scheduled its Seventh Annual Technical Meeting for Oct. 29-31, in Detroit, Mich. Present plans call for eight technical sessions by leading speakers and engineers on latest developments and trends in automobile body styling, materials, and production engineering. As has been customary in the past, leading suppliers and parts manufacturers in the industry will have exhibits of their products on display.



Air-O-Matic Power Steer Booster installed on White Truck Model 302264

AIR-O-MATIC *AIR POWER STEERING*
for
SAFE STEERING ASSIST

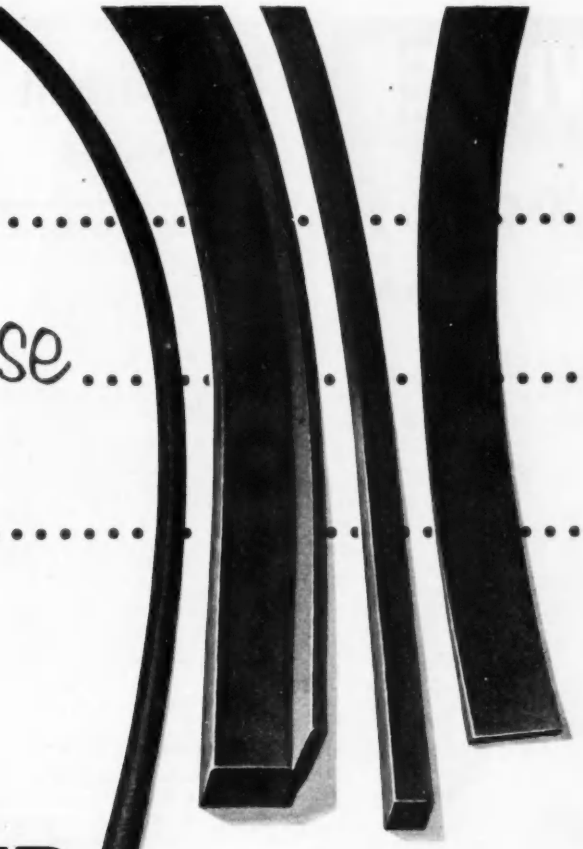
A self-contained unit, easily installed. Only one air line required.
Low initial cost and maintenance.
Used by manufacturers of trucks, tractors, Moto-Cranes, off-the-road equipment, Military and other vehicles.
Technical information furnished upon request.

AIR-O-MATIC POWER STEER CORP.
24 Noble Court N. W. Cleveland 13, Ohio

new.....

ready to use.....

speedy.....



3M EXTRUDED SEALERS

Here's a valuable new addition to the 3M line of automotive products . . . 3M extruded sealers.

3M extruded sealers come in a variety of sizes, ready-made for fast, hand application on your production line. 3M extruded sealers eliminate the need for pressure extruding equipment and make possible a quick, on-the-spot seal. *And*, if you need a special shape extrusion, 3M will die-cut one to your specifications!

An additional feature of some 3M extruded sealers is their expansion when heated. These sealers swell about *50% under heat* and cure to tough, rubber, gasket-like seals especially valuable when faying surfaces are irregular, and a completely tight seal is necessary. These sealers give a high degree of adhesion, and can be painted over handily.

Ask your 3M salesman to show you his line of extruded sealers . . . they are tailor made for the auto industry. Like all 3M products, extruded sealers are *engineered* for top quality and performance, ready to do a bang-up job for you! For more information about 3M extruded sealers write 3M, Dept. 106, 411 Piquette Avenue, Detroit 2, Mich.

FIFTIETH ANNIVERSARY 3M COMPANY 1902 ★ 1952

ADHESIVES • COATINGS • SEALERS

MINNESOTA MINING AND MANUFACTURING COMPANY • ADHESIVES AND COATINGS DIVISION

411 PIQUETTE AVE., DETROIT 2, MICH.

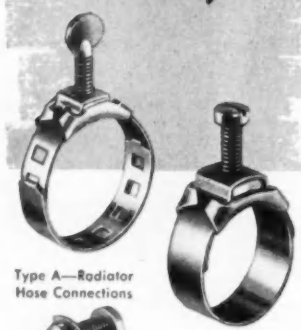
GENERAL SALES OFFICE: ST. PAUL 6, MINN. • EXPORT OFFICE: 270 PARK AVE., NEW YORK 17, N. Y. • IN CANADA: LONDON, CANADA

MAKERS OF "SCOTCH" BRAND PRESSURE-SENSITIVE ADHESIVE TAPES • "SCOTCH" BRAND SOUND RECORDING TAPE • "SCOTCHLITE" BRAND REFLECTIVE SHEETINGS • "3M" ABRASIVE PAPER AND CLOTH • "3M" ADHESIVES AND COATINGS • "3M" ROOFING GRANULES • "3M" CHEMICALS

WITTEK

NOC-OUT HOSE CLAMPS

The Standard of the Automotive Industry



Type A—Radiator Hose Connections

Type G-BB—Booster Brake Hose Connections No. G-B-HH for Hot Water Heater Hose

Type HP—High Pressure Hose Connections

Wittek Noc-Out Hose Clamps are designed in a variety of types made in many sizes for use by the automotive industry. Because they provide the most practical leakproof hose connection, they are specified by the leading manufacturers as standard, original equipment for automobiles, buses, trucks and tractors.

Write for descriptive literature.

Automotive HOSE CLAMPS

WITTEK MANUFACTURING CO.

4319 W. 24th Place, Chicago 23, Ill.

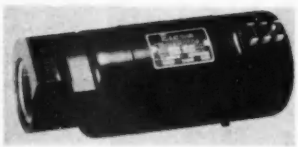
Dependability in Hose Clamps for Over a Quarter of a Century

New Aircraft Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 68)

Dynamotors

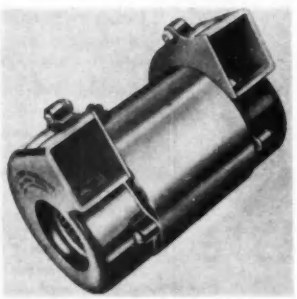


Now available is a dynamotor that is said to provide quick interchangeability and additional cooling of electronic tubes. This unit is capable of operation at any altitude between zero and 65,000 ft, and at any ambient temperature between the limits of —55 C and 71 C. Regulation of this unit is within 11 per cent. (Eicor, Inc.)

Circle P-3 on page 65 for more data

High Frequency Blower

Special electric variable frequency motor-blowers, now on the market, are powered by the standard generators linked to the aircraft engines. The series of variable frequency units have been designed to minimize stator and rotor losses. Rotor diameters are reduced while stator sizes are correspondingly increased.



American high frequency blower.

The blowers operate at high average speeds and at low input over the complete frequency range encountered. The motors operate within an ambient temperature range of —65 C to +65 C. *American Electric Motors.*

Circle P-4 on page 65 for more data

THEY'RE ON THE JOB

For Jet or Reciprocating Engines Airborne or Test Stand Use

ThermoElectric THERMOCOUPLES

They are on the job for all important temperature measuring applications. All are available in standard calibrations and in many types for most aircraft and engine installations.

To reduce set-up time of Test Stand Thermocouples, this Type 4C21P Turbo-Engine Exhaust Thermocouple is fitted with our Quick Coupling Connection Head.

ThermoElectric ENGINE HARNESSES

TURBO-ENGINE HARNESS ASSEMBLIES connect multiple thermocouples in parallel to one instrument lead. The equal resistance between any pair of thermocouple connections and main terminals permits checking temperatures of individual thermocouples or the average temperatures of the entire circuit.

RECIPROCATING ENGINE HARNESSES are designed to check the temperature of each cylinder head thermocouple.

All Harnesses are designed and engineered to meet individual engine requirements.

For additional information on our Aircraft Products, Send for Catalog Section **12J.**

FAIR LAWN — ThermoElectric CO., INC. — NEW JERSEY

ALL NEW!

The Bostrom Level Ride "60"

America's Smoothest Riding Truck Seat!

For years Bostrom hydraulic suspension seats have led the field for safety, comfort, and economy. Ever since this revolutionary seating principle was introduced 12 years ago, Bostrom seats have been first in sales, first in popularity. And rightly so, for they allowed riding ease never before thought possible by truck engineers.

And now Bostrom is proud to announce the latest in this series of outstanding truck seats, the Model "60"! It has all the qualities that made previous Bostrom seats "best by test" plus these outstanding improvements.

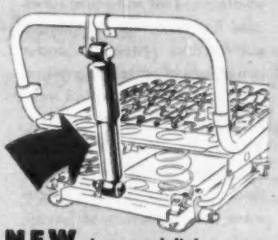
- ★ *Air vent between back pad and seat cushion for improved ventilation.*
- ★ *Back pad spring arranged to cradle driver.*
- ★ *Back of seat inclosed for greater durability and riding ease.*
- ★ *Improved linkage system to soak up all jolts and jars.*

Bostrom seats are standard or optional equipment on most leading trucks.

For further information write directly to:

FEATURES

NEW Back pad spring arranged to cradle driver eliminating back strain and back aches. Back of seat inclosed for greater durability and riding ease.



NEW Improved linkage system soaks up all jolts and jars.

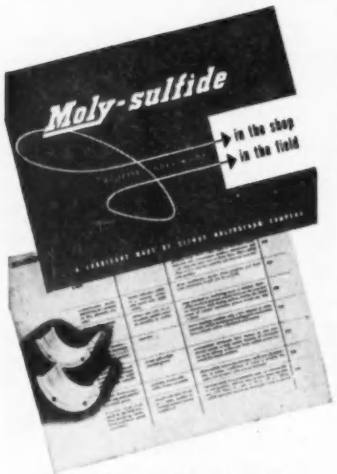
NEW Air vent between back pad and seat cushion for increased ventilation.

BOSTROM **BOSTROM MFG. CO.**

133 WEST OREGON ST., MILWAUKEE 4, WIS.

BOSTROM LEVEL RIDE "60" is standard or optional equipment on the following trucks: International Harvester, Diamond T, Sterling White, Reo, FWD, Federal, Oshkosh, Dart, Walter, Hendrickson, Duplex, Peterbilt, Kenworth, White Freightliner, Ward La France.

154 ideas on ways to use...



154 varied applications of molybdenum sulfide in the shop and in the field are described in a new booklet now available. This solid-film lubricant has demonstrated unique anti-friction properties under conditions of extreme pressure, high velocity, elevated temperature, or chemical attack.

The 40-page booklet contains the records of solved lubrication problems — some might solve your own.

Moly-sulfide
A LITTLE DOES A LOT

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Position.....
Company.....
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AI-6 MS-6

CALENDAR

OF COMING SHOWS AND MEETINGS

SAE Summer Meeting, Atlantic City, N. J.....June 1-6

36th Annual Meeting, American Gear Manufacturers Association, Homestead, Hot Springs, Va. .....June 2-4

Third Annual Conference on Industrial Research, Columbia Univ., New York, N. Y.....June 9-13

Triennial Meeting of the International Organization for Standardization, Columbia University, New York, N. Y.....June 9-21

National Truck, Trailer and Equipment Show, Los Angeles, Calif. June 12-15

Industrial Finishing Exposition, Chicago, Ill. .....June 16-20

First International Exhibition of Aircraft Parts and Equipment, Hotel Park Sheraton, New York, N. Y.....June 17-19

American Society of Mechanical Engineers, Applied Mechanics Div., Shock and Vibration Instrumentation Symposium, State College, Pa. .....June 19-21

American Society for Testing Materials (annual meeting), New York City .....June 23-27

SAE West Coast Meeting, San Francisco, Calif. .....Aug. 11-13

Third Annual Elkhart Lake Road Races and Rally, Sports Car Club of America, Elkhart Lake, Wis. .....Sept. 5-7

American Standards Assn., Third National Standardization Conference, Chicago, Ill.....Sept. 8-10

Instrument Society of America (sixth annual meeting), Cleveland, Ohio .....Sept. 8-12

SAE Tractor Meeting, Milwaukee, Wis. .....Sept. 9-11

SAE National Aeronautic Meeting, Los Angeles, Calif.....Oct. 1-4

Paris Automobile Show, Paris, France .....Oct. 2-12

Society of Industrial Packaging and Materials Handling Engineers, 7th Annual Exposition, Chicago, Ill. .....Oct. 14-16

37th International Motor Exposition, London, England .....Oct. 15 22

National Metal Show, Convention Hall, Phila., Pa.....Oct. 20-24

SAE Transportation Meeting, Pittsburgh, Pa. .....Oct. 22-24

1953

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y.....Feb. 24-27

National Association of Corrosion Engineers Ninth Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill.....Mar. 16-20

Fifth Materials Handling Exposition, Convention Hall, Philadelphia, Pa. .....May 18-22

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J....June 29-July 3

Eighth National Instrument Conference and Exhibit, Chicago, Ill., Sept. 21-25

Screen Making
looks mighty simple

Screen Making—is simply a matter of making the right kind of openings of the right shape in the right arrangement in the right metal to fit into the well in the right manner so that the right amount of water can enter the pump bowl area with a minimum amount of resistance while holding back the sand formation. Outside of those details, the job is quite simple.

And the right kind of screen in a well is about as important as is the right kind of motor in an airplane. Fifty years ago, Layne bucked the screen problem and came up with something that hasn't been matched by any other manufacturer.

If Layne builds your water supply units and if sand screen is necessary, your job will have the famous Layne horizontally slotted screen. This means that your well will have a longer life, produce more water and operate on a lower cost than is possible with ordinary conventional screens.

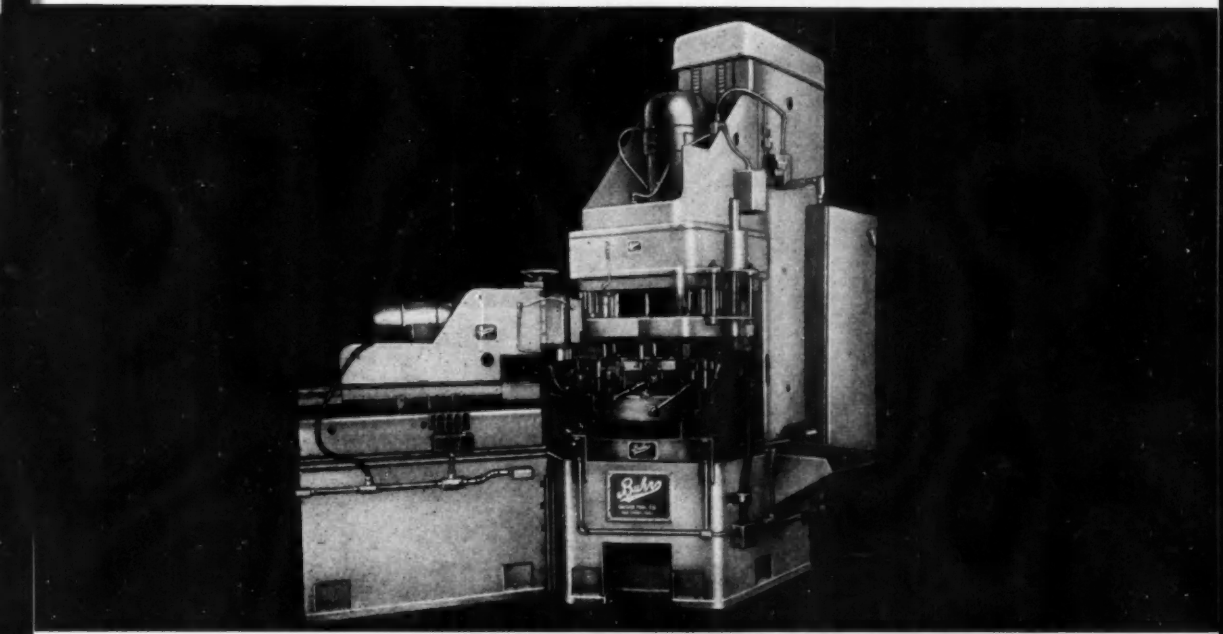
For further information about water wells and complete water supply installations with Layne sand screens, address

LAYNE & BOWLER, INC.
General Offices, Memphis 8, Tenn.

Layne

WATER WELLS
VERTICAL TURBINE PUMPS
WATER TREATMENT

NO JINX NOW FOR JUDY OR JANET



Once, it took a man to drive a car. . . . Now it's second nature for teen-ager Judys and grandma Janets to drive them. . . . Easy or effortless to shift gears . . . easy to steer . . . to brake and accelerate . . . even easier to own the cars—thanks to modern automotive engineering and production! . . . Here's one of the reasons—Production Equipment to make the parts for modern cars . . . . Equipment like this Buhr Two-Way Hydraulic-Feed Milling, Drilling and Tapping Machine—one Machine which an Automotive Giant depends on morning-noon-and-night to process Water Outlet Connections for modern engines—to manufacture parts so well and so economically . . . that driving a car is no longer a jinx for Judy or Janet!

Modern Auto-Making Economy Achieved by This Type of 2-Way 6-Station Unit

In the constant competitive combat of the auto industry, every company strives persistently for greater production efficiency. Always, they try to group manufacturing operations to keep costs to the minimum. Recently, to produce a new part for a revolutionary engine, one of the auto companies decided to group operations in one machine.

One of Their Problems

To mill, drill and tap a Water Outlet Connection—that was their immediate problem. To make the Equipment to handle this phase of their production, they called in Buhr.

What the Machine Does

In general—it mills mounting Flange; combination drills and reams 2 holes and spotfaces small Flange surface; combination bores 2 holes and drills 2 holes; combination counterbores and countersinks 2 holes, and combination drills and reams 2 holes, and taps 2 holes.

Specifically, the Machine does this—

Station 1—Load and Reload

Station 2—Mills mounting Flange surface

Station 3—(1st Position) Combination drills and reams (2) .406 dia. holes; (2nd Position) Spotfaces small Flange surface to 2.320 dia.

Station 4—(1st Position) Combination bores (2) .350 dia. and (1) .440 dia. bore; (2nd Position) Drills (2) .257 dia. holes.

Station 5—(1st Position) Combination counterbores (2) .570 dia. and (2) .06 dia. holes; (2nd Position) Countersinks (2) 90° x .280 holes.

Station 6—(1st Position) Combination drills and reams (2) .328 dia. holes; (2nd Position) Taps (2) 5/8-18 Class 2 holes.

PRODUCTION—144 Parts at 100% Efficiency.

Why Buhr Was Chosen

For more than a quarter-century, Leading Auto Makers have depended on Buhr for efficient production. . . . Especially in the field of Multiple-Spindle Drill Heads, the name of Buhr has long meant the finest. . . . Buhr's manufacturing facilities are excellent. . . . In sales, engineering and production, Buhr has trustworthy and experienced staffs—the kind of staffs these leading Auto Giants turn to when production problems call for this type of Special Machinery.

For Details About BUHR

A comprehensive Catalog . . . or a personal call from a Buhr Sales Engineer . . . is yours for the asking wherever you are located in the United States! . . . For every problem involving this type of Special Machinery—including the type which helps beat the jinx for Judy and Janet—phone, wire or write us.

BUHR MACHINE TOOL CO.
Ann Arbor, Michigan
Phone: Ann Arbor 2-5646—5980
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Buhr ***SPECIAL MACHINERY . . . Leaders Make Sure With BUHR***

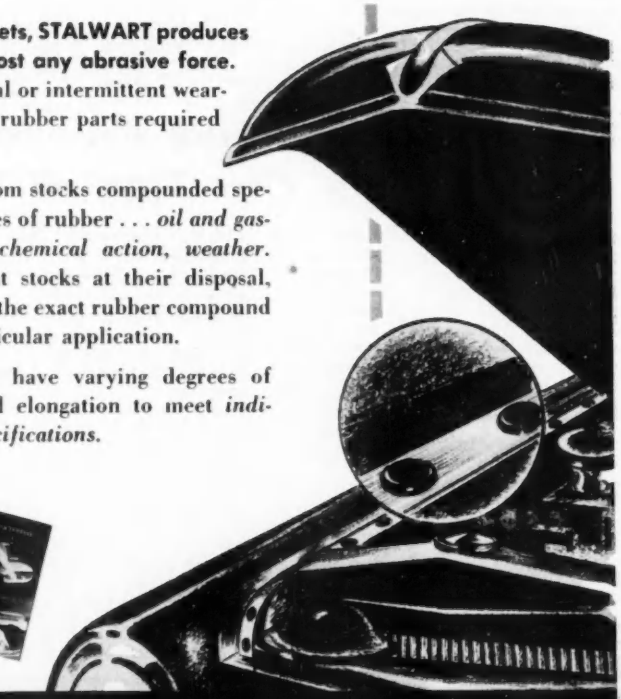
WHEN ABRASION IS THE PROBLEM...

...SPECIFY STALWART RUBBER PARTS

From dog bones to hood grommets, STALWART produces rubber parts to withstand almost any abrasive force. Maximum resistance to continual or intermittent wearing action can be built into the rubber parts required for *your product.*

STALWART can supply parts from stocks compounded specifically to combat other enemies of rubber . . . *oil and gasoline, extreme temperatures, chemical action, weather.* From more than *500* different stocks at their disposal, **STALWART** experts can specify the exact rubber compound which will serve best in a particular application.

Precision-fabricated parts can have varying degrees of hardness, tensile strength, and elongation to meet *individual, S.A.E. or A.S.T.M. specifications.*



Write today for illustrated catalog No. 51SR-1 for additional details.

610-SR

STALWART RUBBER COMPANY

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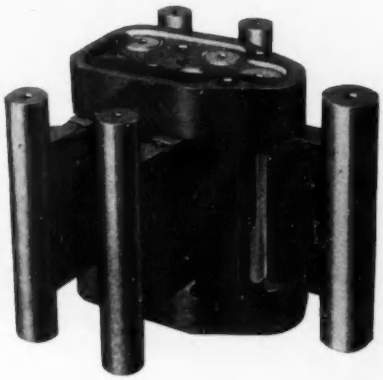
Do you know...

ACME'S XN TOGGLE DESIGN IS EXCLUSIVE?



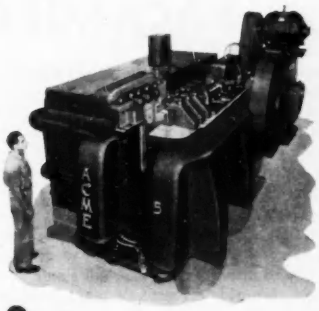
Double Toggle Cluster for 2" and larger machines.

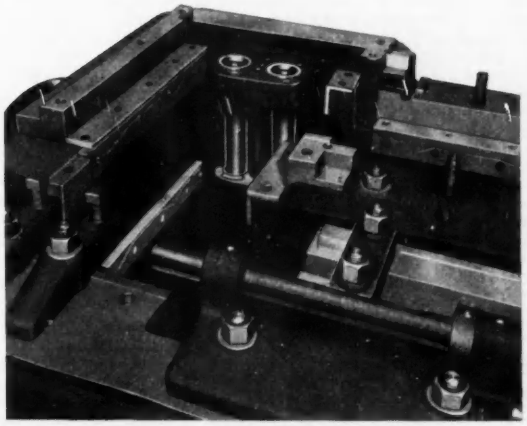
● Among the outstanding features of the Acme XN Forging Machine, none is more important than the Acme Toggle design and construction.

This solid Toggle link construction, exclusive to Acme XN Forging Machines, has large continuous surface areas which reduce pressures per square inch, reflecting lower maintenance cost. Acme design eliminates shoulder wear on pins and bushings common to the hinged or laced type toggles.

The Toggle Links rigidly support the gripping die with a continuous bearing throughout the entire length and height, insuring uniform gripping in all parts of dies and resisting any tendency for the forging dies to breathe—the common cause of excessive flash, swollen and eccentric forgings.

The powerful action of the Acme Toggle Mechanism permits numerous operations, such as squeezing, piercing, shearing, as well as actual forging operations to be performed between the forging dies.





Die Slide Pocket for Double Toggle 2" and larger machines.

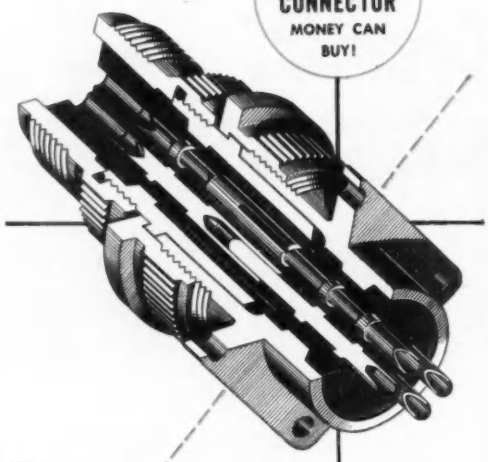
HILL ACME TOOLS OF INDUSTRY

THE HILL ACME COMPANY

ACME MACHINERY DIVISION • **1209 W. 65th St., Cleveland 2, Ohio**
ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING AND POLISHING MACHINES
HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES

The Finest
ELECTRICAL CONNECTOR MONEY CAN BUY!



SCINFLEX **ASSURES YOU PEAK PROTECTION AGAINST CIRCUIT FAILURE**

When operating conditions demand an electrical connector that will stand up under the most rugged requirements, always choose Bendix Scinflex Electrical Connectors. The insert material, an exclusive Bendix development, is one of our contributions to the electrical connector industry. The dielectric strength remains well above requirements within the temperature range of −67°F to +275°F. It makes possible a design increasing resistance to flashover and creepage. It withstands maximum conditions of current and voltage without breakdown. But that is only part of the story. It's also the reason why they are vibration-proof and moisture-proof. So, naturally, it pays to specify Bendix Scinflex Connectors and get this extra protection. Our sales department will be glad to furnish complete information on request.

• Moisture-Proof • Radio Quiet • Single Piece Inserts • Vibration-Proof • Light Weight • High Insulation Resistance • High Resistance to Fuels and Oils • Fungus Resistant • Easy Assembly and Disassembly • Fewer Parts than any other Connector • No additional solder required.

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ELECTRICAL CONNECTORS

Bendix

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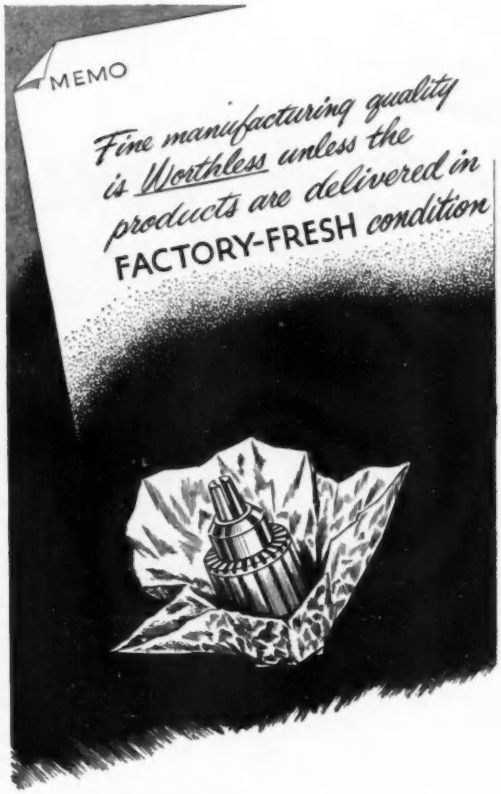

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Recognized manufacturing leadership justifies real pride. It is something to shout about. But do your fine products have full protection against dirt, moisture, dust, water, abrasion . . . under extremes of heat and cold . . . while in transit or storage? If not, they are subject to severe damage that can make superior design and original top quality worthless to buyers; and your reputation is in danger. So don't gamble. Call on Kennedy for the services of expert packaging engineers who are always ready to develop the correct bags and covers of paper, foil, plastic film or combinations of each that will assure this vital protection. Kennedy's extensive plant is also fully equipped to produce the necessary items exactly as specified, in the quantity required, at a price that's right. Such *engineered* packaging means product delivery in factory-fresh condition, regardless of time or weather. Write, wire or 'phone today. There's no obligation.

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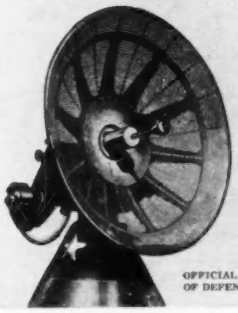
GREATER VARIETY
HIGHER QUALITY

ALLMETAL "AN"

STAINLESS STEEL FASTENERS

MACHINE SCREWS • NUTS • BOLTS • WASHERS • PINS • RIVETS

AVAILABLE IMMEDIATELY FROM STOCK, an endless stream of first quality "AN" stainless fasteners is Allmetal's answer to the exacting demands of defense production . . . in aircraft, electronics, ordnance, in industry everywhere. Always remember Allmetal, to get the fasteners you want—when you want them.



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WUX, New York
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STAINLESS STEEL FASTENERS

MANUFACTURERS SINCE 1929

ALLMETAL

SCREW PRODUCTS COMPANY, INC.

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Another Packaging Problem Solved by METAL EDGE

A CASE HISTORY:

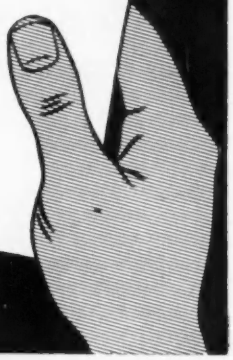
PROBLEM:
A hardware manufacturer's display boxes had color, compactness and good visibility—but failed to win dealer support because they were too often damaged in shipment.

SOLUTION:
Metal Edge engineers were consulted. They retained the old design, but made the box practically damage-proof.

RESULT:
"The Metal Edge box withstands rough handling . . . we actually guarantee it to be in good condition for counter selling . . . Our salesmen use the package to open new accounts."*

*letter from V.P.

METAL EDGE—the engineered method—has solved diverse packaging problems in more than 100 American industries.



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NATIONAL METAL EDGE BOX CO.

PACKAGING • MATERIALS HANDLING • INVENTORY CONTROL

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Engineered CUSHION SEATS

FOR EFFICIENT PERFORMANCE

Milsco MILWAUKEE

*WITH MANY NEW FEATURES

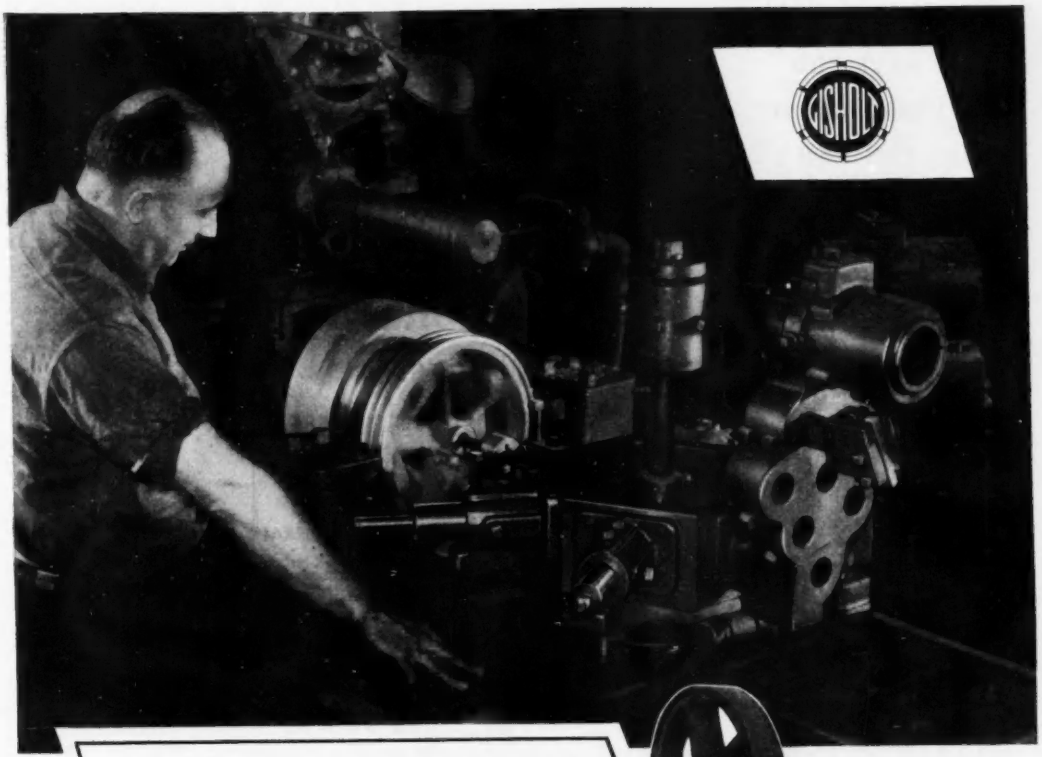
NO. 1783 DELUXE CUSHION SEAT

Milsco means comfort . . . more man-power . . . more work-power. This Deluxe Cushion seat is engineered for all types of heavy duty equipment . . . for rough and tough going . . . with built-in body-ease and back support. Padded seat with four inches of foam rubber; two inches of foam rubber on back and side walls. Genuine black leather covering. Safety side handles; two easy-to-attach bolts. Many other models.

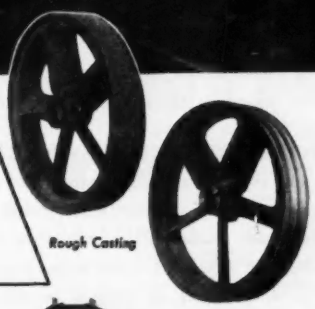
Our 26th Year

★ GENUINE LEATHER WITH FOAM RUBBER

MILSCO MANUFACTURING CO., 2730 N. 33rd St., Milwaukee 45, Wis.



Production Trebled by the FASTERMATIC!



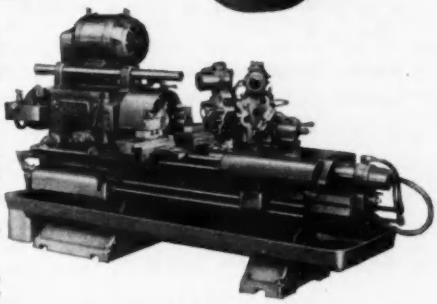
Rough Casting — Finished Sheave

Note here the rather simple tooling arrangement for machining cast iron sheaves. This setup, similar to regular turret lathe work, is made just as easily. But here, the machine performs 15 different operations—holds tolerances consistently—completes the entire machining job in 13 minutes. The former time was 39 minutes.

Completely Automatic Cycle

It's the swift, automatic cycle of the Fastermatic that accounts for such substantial time savings. With its hydraulic feed system and automatic speed control, the operator has only to load the chuck, start the machine and remove the finished work. Usually, the operator has time to tend a second machine.

Now, when you need still greater production, it is a good time to look into the Fastermatics. Write for the Fastermatic catalog.



The Fastermatics are universal automatic turret lathes. Designed for accurate, high production turning, they can also be economically used on comparatively small lot work.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY Madison 10, Wisconsin

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

HAVE YOU HEARD ABOUT THIS NEW METAL CLEANER?
IT CAN SAVE MONEY FOR YOU
New metal cleaner removes oil and rust in one operation
OAKITE PRODUCTS, INC.

Oakite Compound No. 33

REMOVES OIL
at the same time that it
REMOVES RUST...
And at the same time it prepares the metal for painting

Oakite Compound No. 33 is a great soak cleaner for steel, cast iron, aluminum sheet and castings. It removes oil, rust, heat scale, other oxides, carbon smut, soldering and welding residues, identification inks and other soils. *It frequently eliminates pickling operations on moderately rusty steel.*

Oakite Compound No. 33 is great for hand-swabbing on metal surfaces too large to be soaked in tanks. It can save money for you in many ways.

FREE For a copy of Folder F7993 "*New metal cleaner removes oil and rust in one operation*", write to Oakite Products, Inc., 28A Rector St., New York 6, N. Y.

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MATERIALS • METHODS • SERVICE
Technical Service Representatives in Principal Cities of U. S. & Canada

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Metallic Aluminum-Fused-Oxide Steel Asbestos

GASKETS end costly gasket failures

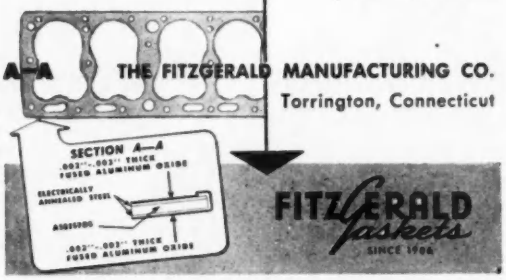
Specially designed, ruggedly built, to give a lasting, perfect seal in high compression engines, gasoline or diesel.

There's a Fitzgerald Gasket for Every Engine

Grease Retainers

Cork Gaskets

FITZ-Rite Treated Fiber Gaskets for oil, gasoline and water connections



THE FITZGERALD MANUFACTURING CO.
Torrington, Connecticut

Q Can you put VITREOUS ENAMEL on ALUMINUM?

A Yes—SEE ALCOA. Alcoa's finishing laboratories are continually improving and developing finishes for aluminum—painted, electroplated, anodized plus chemical and mechanical treatments. For the latest information, simply write on your company letterhead to:

ALUMINUM COMPANY OF AMERICA
1973-F Gulf Building Pittsburgh 19, Pa.

ZOURITE FACING MATERIAL
Manufactured by The Kawneer Company, Niles, Michigan

ALUMINUM COMPANY OF AMERICA

How Can America Produce All the Steel It Needs ... for Military... and Civilian Purposes?

FREE BOOKLET Tells How to Conduct Scrap Salvage Program in *Your* Business.

Address Advertising Council, 25 W. 45th St., New York 19, N. Y.

One way is to feed more pig iron into the furnaces. But . . .

That will require *more* supplies of ore, limestone, coal, etc.*—to say nothing of more new ore boats and rail cars to transport the additional supplies.

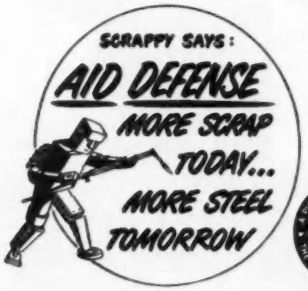
A better way—the *only* practical way—is to use the *dormant* iron and steel scrap lying around in the form of old machines, equipment, tools and metal structures.

Your business *must* have available scrap—in *some* form. That scrap is *needed* to keep the furnaces going in the steel mills . . . to keep our fighting forces and our allies well armed . . . to sustain our civilian life at home.

Think how many ways *you* use iron and steel. Think what would happen if it became extremely scarce. Put your iron and steel scrap to good use—now—by selling it to your local scrap dealer.

Don't delay—the emergency is becoming more severe every day.

*For every ton of scrap fed into the furnaces, we save approximately 2 tons of iron ore, 1 ton of coal, nearly ½ ton of limestone and many other critical materials. Also, scrap helps make steel faster, shortens the refining process.



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This advertisement is a contribution, in the national interest, by

Automotive Industries

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2. An Outstanding Line of Precision Measuring Equipment

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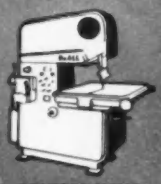
GB-7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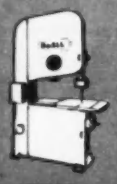
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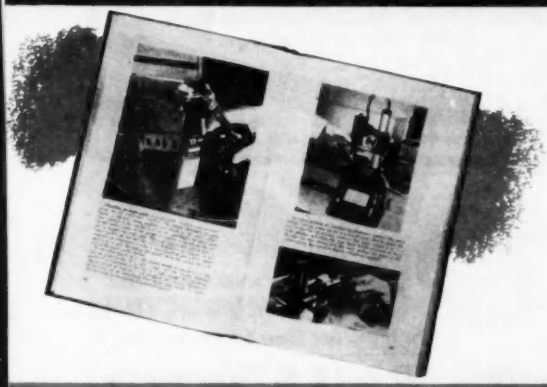

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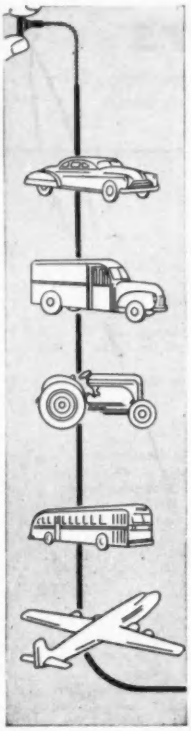

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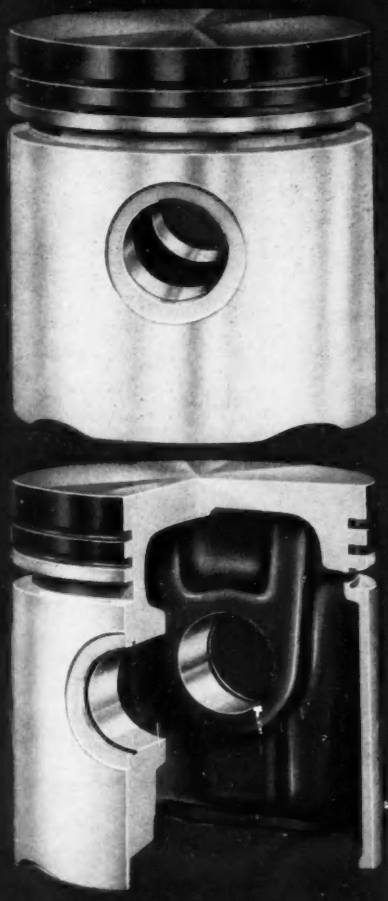

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